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INTRODUCTION

This guide has been provided as an aid to final stage manufacturers in determining conformity to the applicable Emission Control and Federal Motor Vehicle Safety Standards. Final stage manufacturers should maintain current knowledge of all Emission Regulations and Federal Motor Vehicle Safety Standards and be aware of their specific responsibility in regards to each standard.

Any manufacturer making material alterations to this incomplete vehicle during the process of manufacturing the complete vehicle should be constantly alert to all effects, direct or indirect, on other components, assemblies or systems caused by such alterations. No alterations should be made to the incomplete vehicle that directly or indirectly results in any either component, assembly or system being in nonconformance with applicable Emission Regulations or Federal Motor Vehicle Safety Standards.

General Motors Isuzu Commercial Truck, LLC (GMICT) and Isuzu Commercial Trucks of America, Inc. (ICTA) will honor its warranty commitment (**for the cab-chassis only**), to the ultimate consumer, provided: (1) the final stage manufacturer has not made any alterations or modifications which do not conform to any applicable laws, regulations or standards, or adversely affect the operation of the cab-chassis; and (2) the final stage manufacturer complied with the instructions contained in this guide with respect to the completion of the vehicle. Otherwise, the warranty becomes the responsibility of the final stage manufacturer.

The final stage manufacturer is solely responsible for the final certification of the vehicle and for compliance with Emission Control and Federal Motor Vehicle Safety Standards. The information contained in this guide has been provided for the final stage manufacturer's information and guidance.

This guide contains information pertaining to the: NPR/W3500; NPR-HD/W4500 Gas; NPR/W3500; NPR-HD/W4500 Diesel; NQR/W5500, NPR-HD/W4500; NQR/W5500 Diesel Crew Cab; and NRR/W5500-HD Series Chassis Cab.

Following is a list of Federal Motor Vehicle Safety Standards applicable to those vehicles with a GVWR greater than 10,000 lbs. Please refer to the chart on the next page.

FMVSS Chart

List of Federal or Canadian Motor Vehicle Safety Standards applicable to Isuzu/GMC Truck product lines. Gasoline or diesel fueled vehicles with GVWR greater than 10,000 lbs. (4536 Kg)

MVSS No.	Title Upper line FMVSS, Lower Line CMVSS	NPR/NPR HD W3500/W4500	NQR/NRR W5500/W5500-HD
1106	N/A Exterior Noise	1	1
101	Controls and Displays Location and Identification of controls and displays	1	1
102	Transmission shift lever sequence, starter interlock and transmission braking effect Transmission control functions	1	1
103	Windshield defrosting and defogging systems Windshield defrosting and defogging	1	1
104	Windshield wiping and washing systems Windshield wiping and washing systems	1	1
105	Hydraulic and electric brake systems Hydraulic and electric brake systems	2	2
106	Brake hoses Brake hoses	1	1
108	Lamps and reflective devices and associated equipment Lighting systems and reflective devices	2	2
111	Rear view mirrors Mirrors	1	1
113	Hood latch system Hood latch system	1	1
115	N/A Vehicle identification system[2]	1	1
116	Motor vehicle brake fluids Hydraulic brake fluids	1	1
120	Tire selection and rims for vehicles other than passenger cars Tire selection and rims for vehicles other than passenger cars	2	2
121	Air brake systems Air brake systems	3	3

FMVSS Chart (continued)

List of Federal or Canadian Motor Vehicle Safety Standards applicable to Isuzu/GMC Truck product lines. Gasoline or diesel fueled vehicles with GVWR greater than 10,000 lbs. (4536 Kg)

MVSS No.	Title Upper line FMVSS, Lower Line CMVSS	NPR, NPR HD/ W3500, W4500	NQR/NRR W5500/W5500-HD
124	Accelerator control system Accelerator control system	1	1
205	Glazing materials Glazing materials	1	1
206	Door locks and door retention components Door locks and door retention components	1	1
207	Seating systems Anchorage of seats	1	1
208	Occupant crash protection Occupant restraint systems in frontal impacts	1	1
209	Seatbelt assemblies Seatbelt assemblies	1	1
210	Seatbelt assembly anchorages Seatbelt assembly anchorages	1	1
213 213.4	Child restraint systems Built in child restraint systems and built in booster cushions	3	3
302	Flammability of interior materials Flammability	1	1
	N/A On road vehicle and engine emission regulations	1, 3	1
	N/A ICES-002 Canadian Interference causing equipment standard	1	1

Type 1, 2 or 3 numbers to the right hand side of the table designate the appropriate paragraph in the Canadian Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS).

Please see IVD (incomplete vehicle document) for full statements.

Type 1 A statement that the vehicle when completed will conform to the standard if no alterations are made in identified components of the incomplete vehicle.

Type 2 A statement of specific conditions of final manufacture under which the manufacturer specifies that the completed vehicle will conform to the standard.

Type 3 A statement that conformity with the standard cannot be determined based upon the components supplied on the incomplete vehicle, and that the incomplete vehicle manufacturer makes no representation to conformity with the standard.

NOTE: This chart is only a guide. For complete information, please refer to “Document for Incomplete Vehicle” provided with each chassis.

EPA Requirements

NPR/W3500 Gas, NPR/W3500 Diesel, NQR/W5500 Diesel, NPR HD, NQR/W4500, W5500 Diesel Crew Cab and NRR/W5500-HD Series Chassis Cab

The following statement is applicable to all models of incomplete vehicles equipped with diesel engines. (Type 1)
This incomplete vehicle, when completed, will conform to the above standard providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:
-Injection Pump
-Injector and High Pressure Lines
-Turbocharger
-Charger Air Cooler and Charge Air Cooler Hoses
-Engine Control Module (ECM)
-Engine Speed Sensor
-Engine Coolant Temperature Sensor
-Intake Manifold
-Catalytic converter and its location
-Exhaust Gas Recirculation System
-MAF Sensor
-DPD (Diesel Particulate Defuser) and its location

The following statement is applicable to all models of incomplete vehicles equipped with diesel engines. (Type 2)
This incomplete vehicle, when completed with the vertical exhaust system, will conform to the above standard providing it is completed by the final stage manufacturer in accordance with the following specific conditions:
a. the incomplete vehicle manufacturer‘s vertical exhaust system kit is used, and
b. the vertical exhaust system kit is installed to the vehicle in accordance with the incomplete vehicle manufacturer‘s instructions

For more information on the kit and instructions, please call 678-240-9818 or 562-229-5374

The following statement is applicable to all models of incomplete vehicles equipped with gasoline engines . (Type 3)
Conformity with On-Road Vehicle and Engine Emission Regulations cannot be determined based upon the components supplied on the incomplete vehicle, and ISUZU Motors makes no representation to conformity with the standard.

INTERFERENCE CAUSING EQUIPMENT STANDARD – ICES-002

Applies to all models of incomplete vehicles except vehicles equipped with diesel engines contained in this book

TYPE 1 The following statement is applicable to all models of incomplete vehicles except vehicles equipped with diesel engines (unless otherwise noted on the cover of this document)
This incomplete vehicle, when completed, will conform to the above regulations providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:
-Ignition Wires & plugs
-Ignition coil(s)
-Spark plug wires

U.S. ENVIRONMENTAL PROTECTION AGENCY AND STATE OF CALIFORNIA EMISSION EQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDII) REQUIREMENTS
To assure that EPA and California emission certificate requirements and OBDII requirements are met, this incomplete vehicle (except where noted) must be completed in strict accordance with all instructions contained in this document, especially the following instructions which relate to:

A. Exhaust emission related components
B. Specification for fill pipes and openings of motor vehicle fuel tanks (applicable only to California gasoline powered vehicles)
C. Labels

(A) EXHAUST EMISSION RELATED COMPONENTS

1. Compliance of this vehicle with EPA/California emission certification requirements and OBDII requirements will be maintained providing no alterations (except where noted) are made to the components identified below:

-Air inlet system
-Catalytic converter (if equipped)
-Coolant temperature sensor
-Crankcase emission control system
-Diesel fuel injection components/controls
-Engine assembly
-Engine electronics (ECM/PCM/VCM)
-Engine Speed Sensor
-EGR System
-Exhaust emission control system
-Exhaust oxygen sensors (gasoline engine)
-Exhaust system
-*Evaporative emission control system (gasoline engine)
-Fuel injection system
-Fuel system
-Ignition system (gasoline engine)
-Intake manifold
-Turbocharger and associated equipment/controls
-MAF Sensor
-DPD (Diesel Particulate Defuser) and its location

* All Federal/California gasoline powered heavy duty vehicles will have an evaporative emission control system that is certified for a fuel tank capacity not to exceed the amount shown on Vehicle Evaporative Emission Control Information Label. Persons wishing to add fuel tank capacity above the amount shown must contact California Air Resources Board and/or submit a written statement to the EPA Administrator that the Hydrocarbon Storage System has been upgraded according to the requirements of 40 CFR 86-095-35 (g) (2).

2. Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are madeto the fuel filler neck(s).

Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are made to change material or increase the size or length of the following nonmetallic fuel and evaporative emission hoses.

-Fuel feed hoses front and rear
-Fuel return hoses front and rear
-Fuel tank filler hoses to filler neck
-Fuel tank vent hoses to filler neck
-Fuel vapor lines at canister
-Fuel vapor lines from engine to chassis pipes
-Fuel vapor lines from fuel tank sender to chassis pipes

(B) SPECIFICATION FOR FILL PIPES AND OPENINGS OF MOTOR VEHICLE FUEL TANKS (APPLICABLE ONLY TO CALIFORNIA GASOLINE POWERED VEHICLES)

This incomplete vehicle, when completed, will conform to Title 13, California Administrative Code Chapter 3 Air Resources Board Subchapter 7, “Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks”, if no alterations are made to the fuel filler neck(s).

(C) LABELS

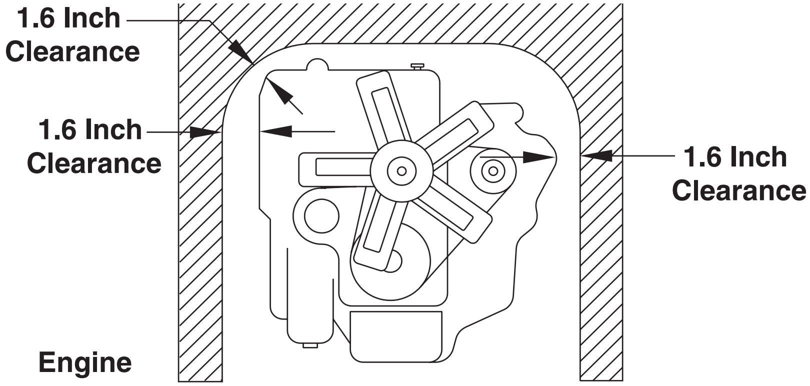
The emission control related information labels and ultra low sulfur diesel fuel label that are permanently affixed are required by government regulation and must not be obstructed from view or defaced so as to impair its visibility or legibility.

INSTALLATION OF BODY AND SPECIAL EQUIPMENT

Clearances

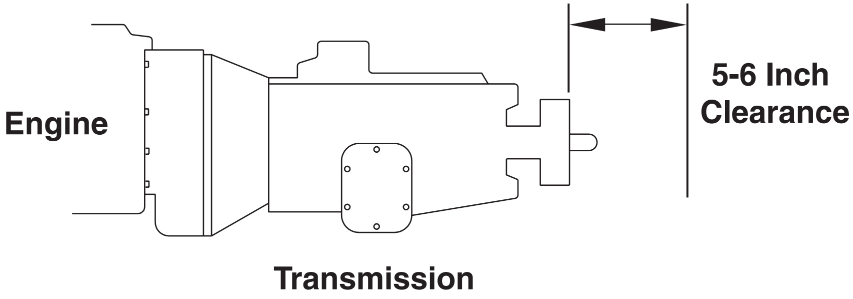
Engine

At least 1.6 inches of clearance should be maintained around the engine. No obstacles should be added in front of the radiator or intercooler.


1.6 Inch Clearance
1.6 Inch Clearance
1.6 Inch Clearance
Engine

Transmission

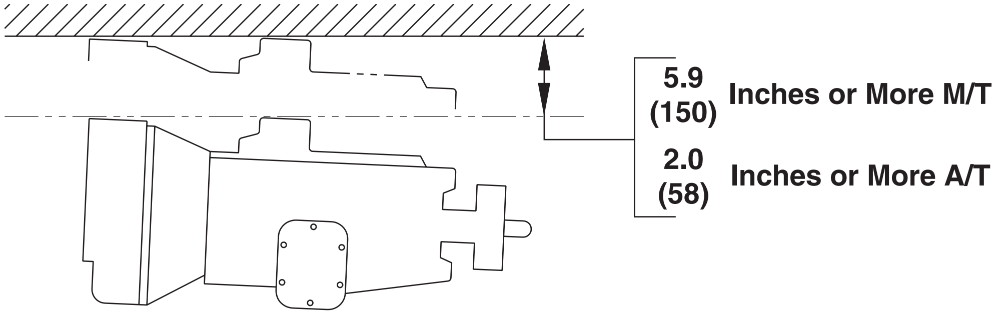
The transmission is removed from the rear. Enough clearance must be provided to allow rearward movement of the transmission assembly. Clearance should be sufficient to allow 5 to 6 inches of unrestricted movement of the transmission assembly. In addition, provide at least 2 inches of clearance around the control lever on the side of the transmission to allow free movement without any binding.


Engine
5-6 Inch Clearance
Transmission

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

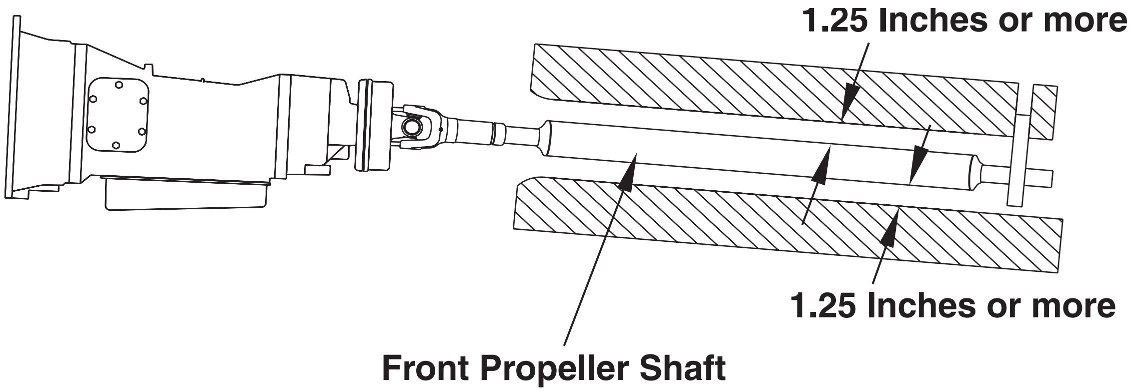
At least 6 inches of clearance should be maintained above the transmission to allow easy removal of the upper cover for manual transmissions. At least 2 inches of clearance should be maintained above the automatic transmission to allow for transmission removal.


5.9
(150)
Inches or More M/T
2.0
(58)
Inches or More A/T

Transmission

Front and Center Propeller Shafts

At least 1.25 inches of clearance should be maintained around front and center propeller shafts.

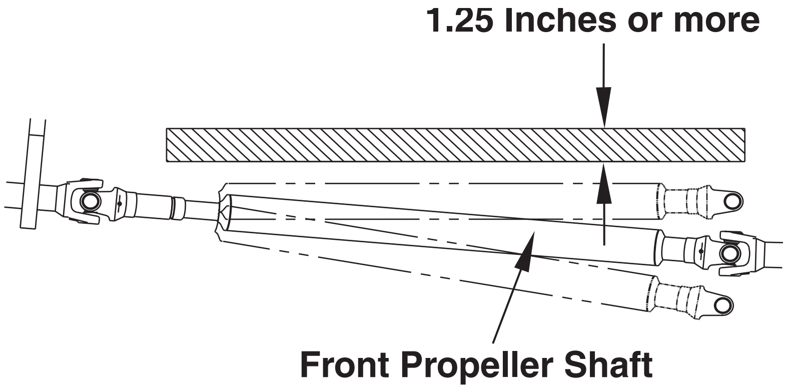

1.25 Inches or more
1.25 Inches or more
Front Propeller Shaft

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Rear Propeller Shaft

With the rear springs at maximum deflection, at least 1.25 inches of clearance should be provided over the rear propeller shaft.



Exhaust System

The exhaust system has a crucial role in meetig 07EPA regulations. In order to maintain compliance withthe 07EPA emissions levels the Diesel Particulate Filter (DPF) must not be moved. The distance between the engine exhaust manifold down pipe and DPF must be maintained and the pressure in the system must be sustained at a constant level. Due to increased temperatures in the exhaust system during the regeneration cycle and the heat stress caused by these temperatures, body builders should closely evaluate the placement of equipment and provide protection to these added components as needed.

(Exhaust System Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

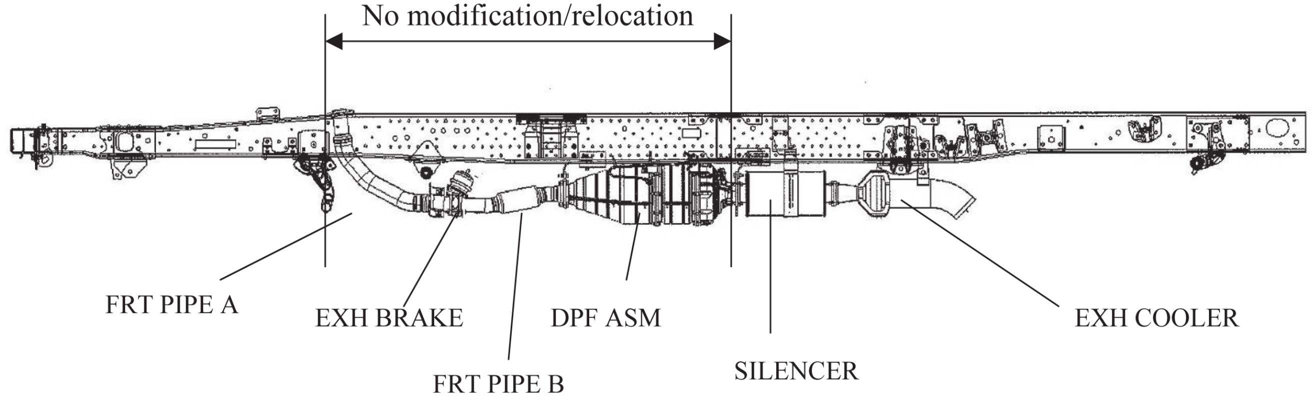
Diesel Particulate Filter (DPF) Restrictions

The DPF has exhaust pressure pipes and temperature sensors.
Care must be taken when a body is installed so as to not damage pipe sensors.
The DPF should be free from impact or vibration during body installation.
The DPF must have enough room for disassemblyof the unit for service and cleaning.
The DPF switch in the cab should not be removed or disabled.
No modification or relocation of the DPF unit, pressure pipes, and sensor is permitted.

(NO MODIFICATION AREA)

The front section before the DPF unit cannot be modified/relocated. The silencer and exhaust cooler can not be modified or removed.

No modification area The front section before the DPF unit cannot be modified/relocated. The silencer and exhaust cooler can not be modified or removed.



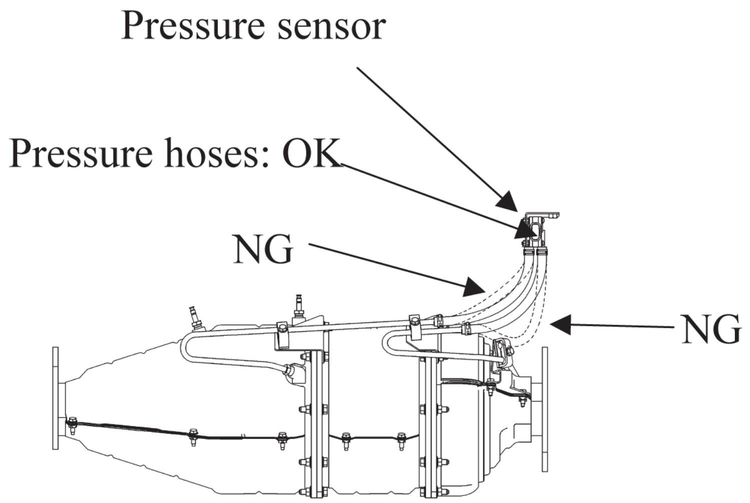
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

TEMPORARY REMOVAL of DPF unit.

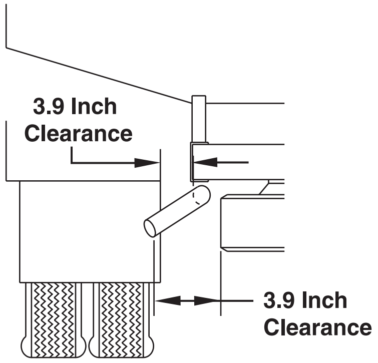
Temporary removal of DPF Unit

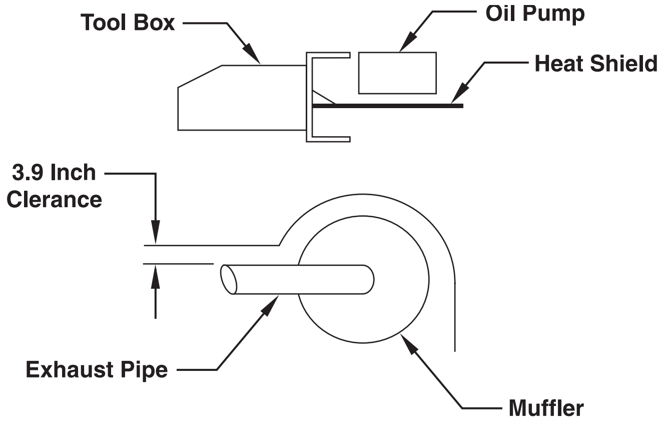
The following conditions must be met:
Harness and hose must be returned to original locations and connections.
Hoses must be free from tension.
There must be no exhaust leaks (confirm this with engine running).
4 nuts on pressure sensors must not be touched.
Pressure sensor must not be dropped. (If dropped, the sensor must be replaced).
The use of an impact wrench on DPF components is prohibited.
If pressure hose is damaged use only OEM replacement parts.


Pressure sensor
Pressure hoses: OK
NG
NG

EXHAUST CLEARANCES

If flammable materials such as wood are ised in the body, provide at least 3.9 inches of clearance between the body and any parts of the exhaust pipe, muffler and Diesel Particulate Filter. If it is impossible to maintain the minimum clearance, use a heat shield. Also use a heat shield if an oil pump or line is located above the exhaust pipe, muffler or catalytic converter.


3.9 Inch Clearance
3.9 Inch Clearance


Tool Box
Oil Pump
Heat Shield
3.9 Inch Clerance
Exhaust Pipe
Muffler

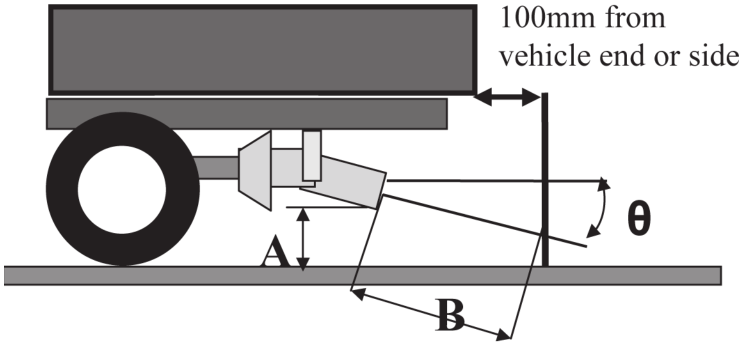
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

(EXHAUST PIPE HEAT)

Exhaust Pipe Heat

During the DPF regeneration cycle, exhaust gas temperatures are hot. Therefore, care should be exercised in placement of the pipe's end location and angle. Do not locate any body parts around the exhaust pipe's end area.



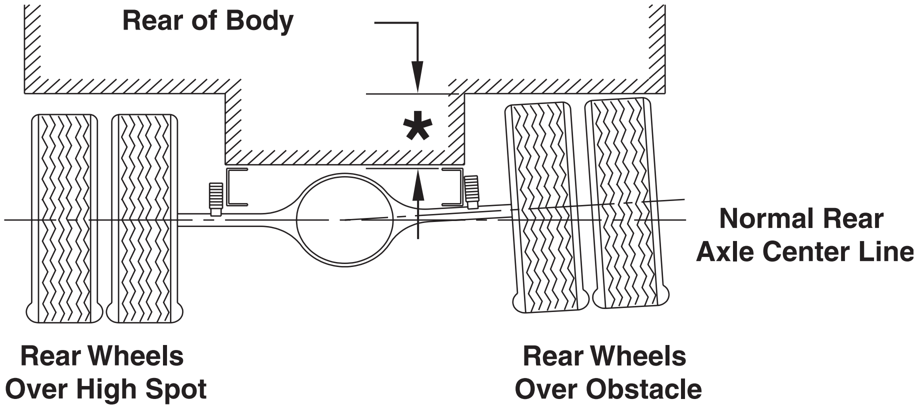
A	B	θ
More than 200mm	More than 450mm	Less than 45deg

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Rear Wheel Axle

The design and installation of the body should allow sufficient clearance for full vertical movement of the rear wheels and axle when the vehicle travels over rough or unlevel surfaces.


Rear of Body
*
Normal Rear Axle Center Line
Rear Wheels Over High Spot
Rear Wheels Over Obstacle

Note: For recommended clearances, please refer to the Rear Axle Chart in each model's respective section.

Other Clearances

The transmission control cable may be broken if it is bent by or interferes with the body and its fixtures. To prevent this, 1 inch of minimum clearance should be provided. When cable is detached from body mounting, be sure not to bend the cable.

Accessibility to the grease nipple on the rear spring bracket/shackle should be provided so that serviceability with a grease gun is not hampered.

Parts	Minimum Clearance	Location
Brake Hose	6.7 in. 1.6 in.	Axle Side Frame Side
Parking Brake Cable	1.2 in.	–
Fuel Hose	1.6 in.	–
Shock Absorber	2.4 in. 1.2 in.	Axle Side Frame Side

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Body Installation

Chassis

To maintain the performance of the truck chassis, either a side member or subframe should always be used for body mounting. Body mounting with low rigidity will often adversely affect riding comfort.

Mirrors

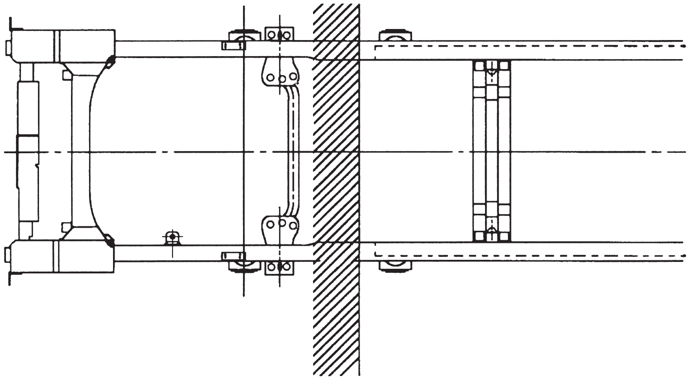
The Isuzu N/W series chasis will accomodate up to 96 inch wide bodies without modification to the mirror brackets.
Bodies from 97 to 102 inches wide will require that the mirror brackets be modified. This Modification can be made at the port and the vehicle order/label will indicate a Regular Product Option of IU3 indicating "Mirror Bracket for 102 wide body".
The brackets can also be modified by the N/W Dealer or the Body Company by installing mirror brackets ordered from Isuzu Parts.

Special Equipment on the Chassis

When installing special equipment on the chassis, extra consideration must be given to the weight and construction of the equipment to assure proper distribution of the load. Localization of the load should be prevented. All special equipment should be properly secured into position. We recommend the use of subframe members when installing special equipment.

Subframe Design and Mounting

The subframe assembly should be mounted as close to the cab as possible. It should be contoured to match the shape and dimensions of the chassis frame as closely as possible.

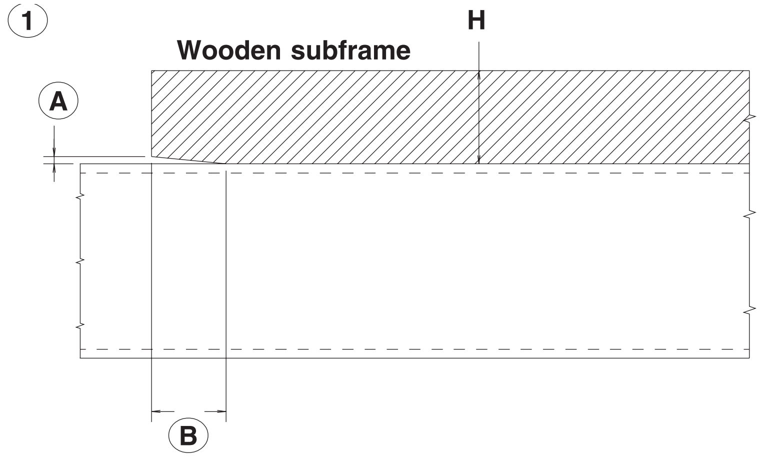


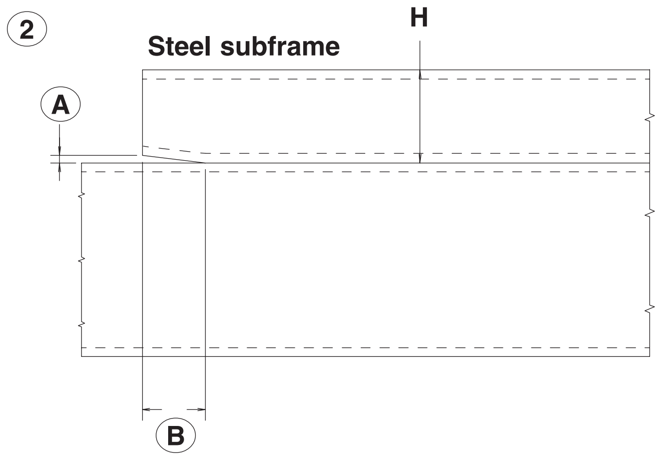
(Installation of Body and Special Equipment Section – continued on next page)

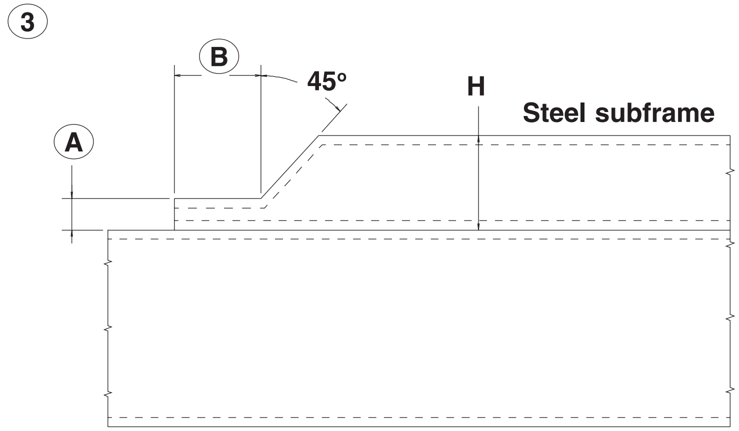
(Installation of Body and Special Equipment Section – continued from previous page)

Subframe Contour

Contouring of the front end of the subframe members as shown in the three illustrations below will prevent stresses from being concentrated on certain areas of the chassis frame.


①
Wooden subframe
H
Ⓐ
Ⓑ


②
Steel subframe
H
Ⓐ
Ⓑ

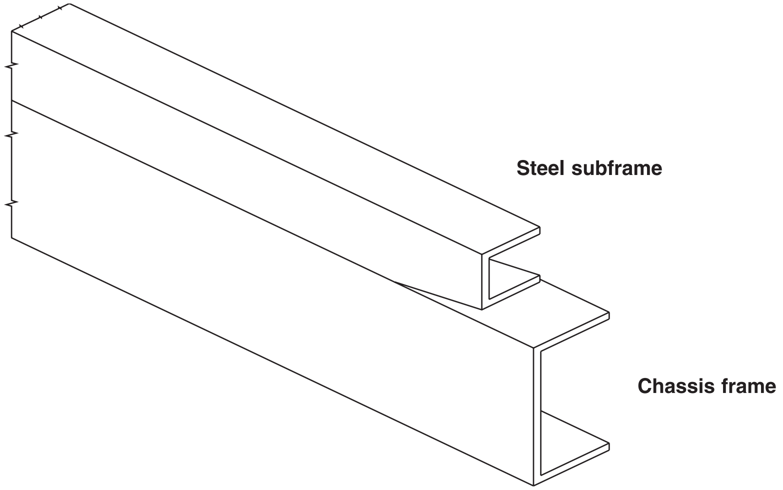

③
Ⓑ
45°
H
Steel subframe
Ⓐ

Drawing	A	B
①	0.2 in.	$\frac{H}{2}$ ~ H
②	0.2 in.	H or more
③	$\frac{H}{3}$	H or more

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

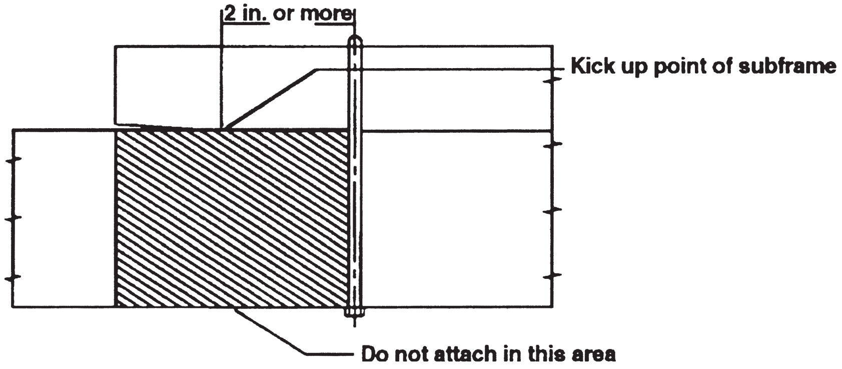
When using a steel subframe, do not close the end of the subframe.


Steel subframe
Chassis frame

Prohibited Attachment Areas

Do not attach the subframe with a bolt on bracket to the chassis frame at the points indicated by shading in the following illustrations.

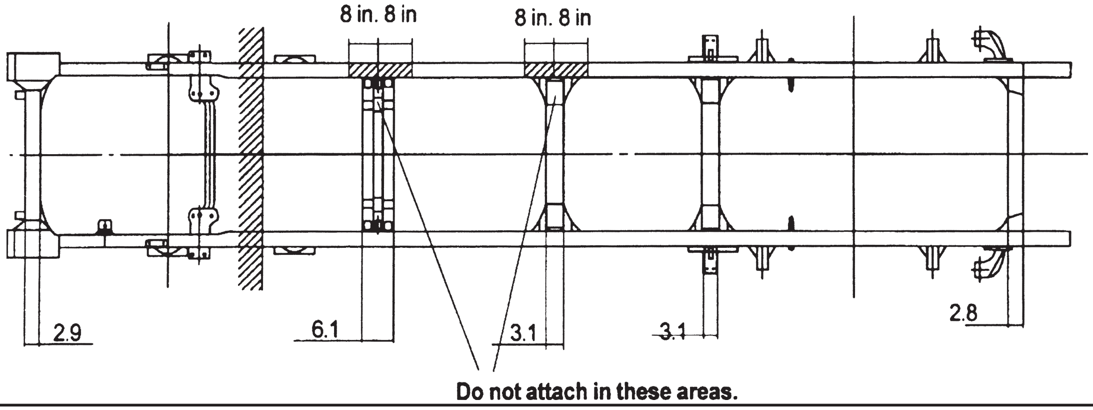
1. At the front end of the subframe. The attaching bolt or bracket must be at least 2 inches behind the kick up point of the subframe.


2 in. or more
Kick up point of subframe
Do not attach in this area

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

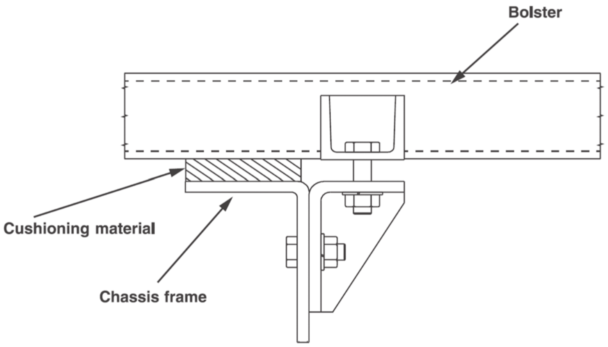
2. Within 8 inches of bends in the chassis frame or the attachment points of any crossmembers.



Subframe Mounting

Bracket Installation

Mounting brackets should be clamped to the chassis frame using bolts. For proper positions in which to install the bolts, refer to the preceding section and the section "Modifications to the Chassis Frame." In addition to the illustrated bracket and U -bolts a shear plate may be required for adequatley body mounting. The body company will be responsible for engineering their own mounting system.



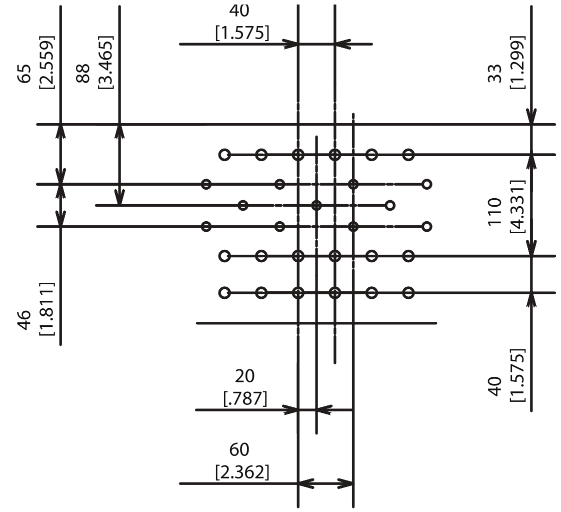
The frame material is a heat treated, carbon manganese, low alloy steel with good weldability. The frame has a 80/40 mm modular hole spacing standard. This standard pattern will assist in body mounting.

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

MODULAR FRAME HOLE PATTERN

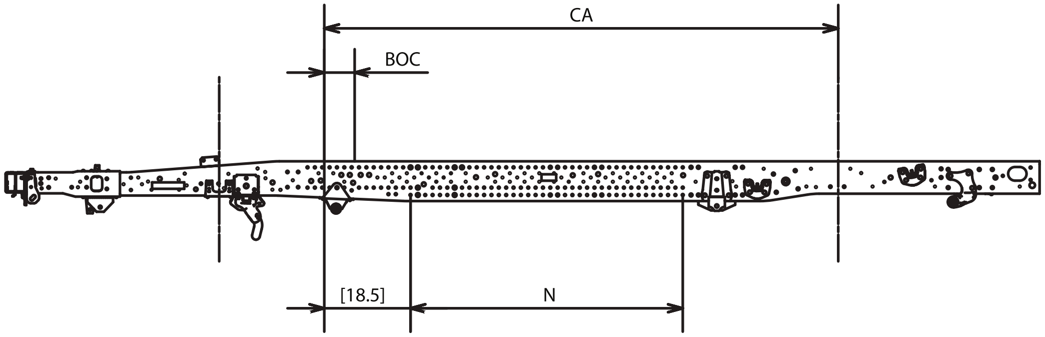
The fame material is a heat treated carbon manganese, and low alloy steel with good welding characteristics. The frame has an 80/40mm modular hole spacing standard. This standard pattern will assist with body mounting.



Basic hole pattern

Depending on model, wheelbase and chassis specification some holes are in use and some holes are intentionally missing. (Subject to change without notice).

Note: Retighten all attaching parts that are loosened during body installation.



Modular Hole Area

WB	N
[109]	880 [34.6]
[132.5]	1480 [58.3]
[150]	1920 [75.6]
[176]	2360 [92.9]

Unit ; mm [Inch]

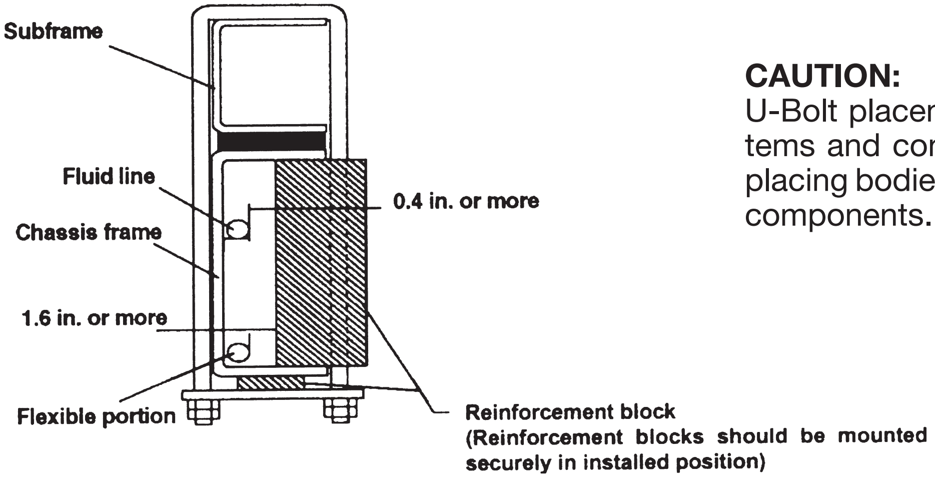
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

U-bolt Installation

When U-bolts are used to retain the subframe, reinforcement blocks must be installed in the frame members. This will prevent distortion of the frame flange as they are tightened. The drawing indicates the correct placement of reinforcement blocks. If you use wood blocks, be sure that there is sufficient clearance between them and any parts of the exhaust system. The use of J-bolts to retain the subframe is strictly prohibited.

If any fluid lines or electric cables are located near the reinforcement blocks, you must provide at least 0.4 inches of clearance between rigid or stationary portions, and at least 1.6 inches between moveable or flexible portions of the lines.



CAUTION:
U-Bolt placement is critical with new emission systems and controls. Extra care must be taken when placing bodies on chassis so as not to damage these components.

For the installation positions of the U-bolts, refer to “Prohibited Attachment Areas.”

Crew Cab Body/Frame Requirement

The Crew Cab NPR HD/W4500 and NQR/W5500 will be available in two wheelbases, 150 and 176 inches. CA will be 88.5 and 114.5 inches. On this model chassis, General Motors Isuzu Commercial Truck, LLC (GMICT) and Isuzu Commercial Trucks of America, Inc. (ICTA) will require that the body installed on the chassis have an understructure manufactured with any of the following structural steel “C” channels:

4” x 1-5/8”, 7.25 lbs./ft. = ok
5” x 1-3/4”, 6.7 or 9.0 lbs./ft. = ok
6” x 2”, 8.2, 10.5 or 13.0 lbs./ft. = ok

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Modification of the Frame

Modifications of the chassis frame should be held to an absolute minimum. Modification work should be performed according to the instructions in the following paragraphs.

When modification is complete, chassis frame members should be carefully inspected to eliminate the possibility of any safety-related defects.

NOTE: PLEASE REFER TO NOTES ON CHASSIS FRAME MODIFICATION WITH ANTILOCK BRAKES.

Working on Chassis frame

The chassis frame is designed and built with consideration for proper load distribution. Sufficient physical strength is provided when the load is evenly distributed. Installation of special equipment on the chassis frame can cause variations in load distribution. If even distribution of load is not kept in mind when the equipment is installed, localization of stresses on specific areas of the frame could cause cracking of the chassis frame members or other problems, even if the total weight of the equipment is within the design limit.

The chassis frame is designed as an integral unit. Therefore, **we do not recommend cutting the chassis frame under any circumstances.**

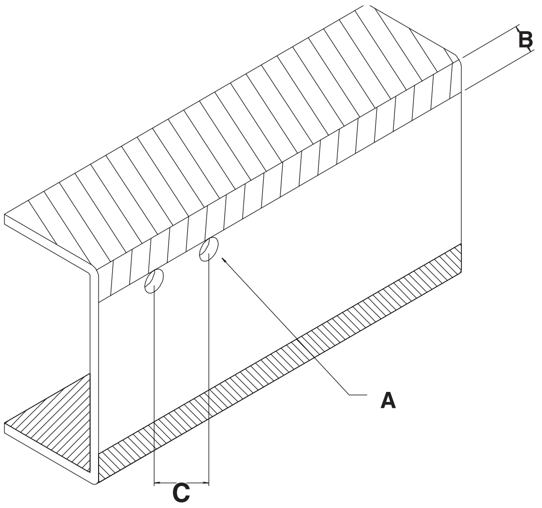
Drilling and Welding

IMPORTANT NOTE: For vehicles equipped with electronic engines and or electronic or hydra-matic transmissions, electric arc welding must be done with the negative battery cable disconnected.

1. Do not drill or weld in the shaded portions of the chassis frame members. Do not weld within 0.8 inches from the edges of any existing holes.
2. Hold the length of any welding beads within 1.2-2.0 inches. Allow at least 1.6 inches between adjacent welding beads.
3. All holes must be drilled. Do not use a torch to make any holes.
4. All riveting must be done with cold rivets. Do not use hot rivets.
5. The flange of the chassis frame must not be cut under any circumstances.
6. The subframe must be attached to the chassis frame with bolts. Do not weld.

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)



Dimensions:
A - not more than 0.51 in. in diameter
B - must be more than 0.8 in.
C - must be more than 1.0 in.

Reinforcement of Chassis Frame

Reinforcements must be installed to prevent the considerable variation in the section modulus. They must be welded so as to avoid localized stresses.

The frame of the N and W Series gas and diesel is made of SAPH440 mild steel.

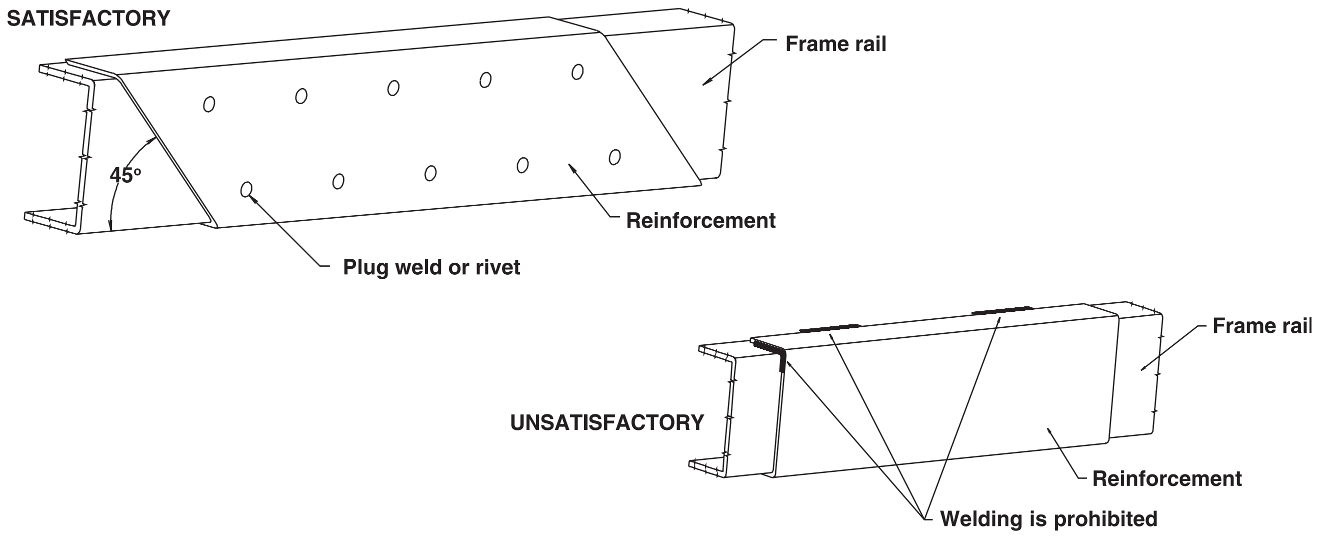
The drawing on the following page illustrates correct and incorrect methods of frame reinforcement.

Welding

1. Keep reinforcement plates and chassis frame free from moisture and water.
2. Avoid cooling with water after welding.
3. Use a suitable means to protect pipes, wires, rubber parts, leaf springs, etc. against heat and effect of sputtering.
4. Remove fuel tank assembly when welding portions near the fuel tank.
5. Remove coat of paint completely when welding painted areas.

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)


SATISFACTORY
Frame rail
45°
Reinforcement
Plug weld or rivet
Frame rail
UNSATISFACTORY
Reinforcement
Welding is prohibited

Fluid Lines

Do not disturb the layout of any brake lines or fuel lines unless absolutely necessary. When modification is needed, follow the instructions below carefully to ensure safety. Brake fluid lines must not be cut and spliced under any circumstances. We do not recommend the cutting or splicing of any fuel lines, but if it is absolutely necessary, be sure that the correct fitting and tools are used to form the joint, and then pressure test the joint. Steel lines are metric sizes.

Preparation of Additional Lines

1. Where possible, use only genuine GM/Isuzu lines as supplied by authorized GM/Isuzu dealers.
2. Use the correct metric flaring and bending tools to form the lines.
3. Avoid repeated bending. Do not use heat for flaring and bending the lines. Before and after forming the new lines, examine them carefully for scratches, distortion, dents and the presence of any foreign matter.

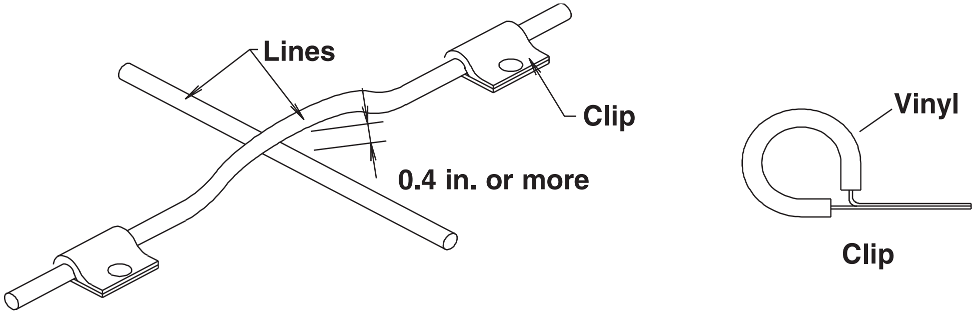
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Installation of Additional Lines

Install new lines away from adjacent parts and away from any sources of heat.

1. A minimum clearance of 0.4 inches must be maintained between lines. Where necessary, clip the lines into position in order to maintain this minimum clearance.
2. Minimize any crossing between lines. If a crossing is unavoidable, use the following procedure:
   a. At least 0.4 inches of clearance should be maintained between lines at the crossing point.
   b. If the 0.4 inches of clearance cannot be maintained, or if the lines are subject to vibration, clip them securely.
3. Plan the bends and clipping points of the lines to minimize vibration and the resulting fatigue.
4. Use rust-proofed clips and apply vinyl coating to the portions of the lines to be clipped.
5. Install new lines in positions where they are protected against water, dirt, grit, sand, rocks and other foreign matter that can come from above or below, or can be flung up by the wheels.



Electrical Wiring and Harnessing

To increase the reliability of the wiring, all frame harnesses are covered with corrugated vinyl tubing. The following instructions apply to extending or modifying these harnesses. See the Electrical Section for information on commonly used circuits in the NPR, NPR HD, NQR, NRR and W-series.

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Wiring

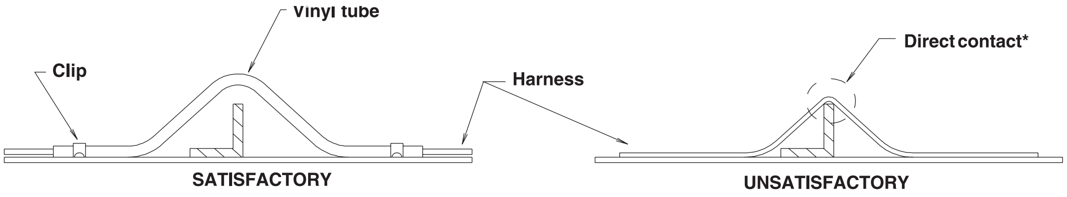
1. Most wiring connections on GM/Isuzu vehicles are made with terminals. We recommend the use of terminals when splicing cables and wires.
2. When splicing, use new wire of the same gauge, and do not make splices inside the corrugated tubing.
3. When making connections to the end of the harness, make sure the connections are electrically perfect. Use insulating tape as needed to prevent the entry of water, which results in short circuits and/or corrosion.
4. When making new circuits, or modifying circuits already installed, make the cables only just taut enough to remove any slack. Use clips or grommets where required to protect cables from heat or sharp edges. When cables must run near the exhaust system, see the instructions in the "Exhaust System" section.
5. Always use rustproof clips, and apply vinyl coating to that portion of the clips in direct contact with the harnesses. No scotch clips or connectors.
6. To minimize the vibration of the harness, clipping points should be set up according to the table.

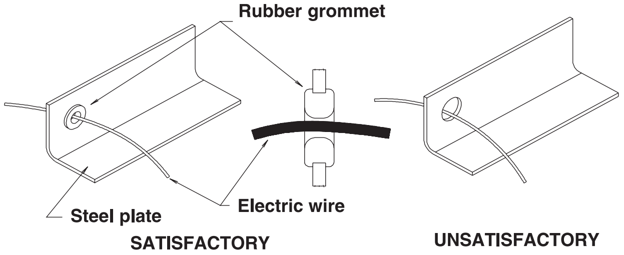
Harness Diameter	Clip Distance
less than 0.2 in.	less than 11.8 in.
0.2 in. ~ 0.4 in.	approx. 15.7 in.
0.4 in. ~ 0.8 in.	approx. 19.7 in.

7. When changing the length of the battery cable, do not cut or splice the existing cable. Make up a new cable of the correct length and wire gauge for the load and distance, without splices.
8. When using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to lower the possibility of a short circuit when disconnected.
9. When connecting cables to moving or vibrating parts such as the engine or transmission, be sure to maintain sufficient slack in the wiring to absorb the vibration. Follow the example of existing cables connected by GM/Isuzu. Keep flexible cables clear of other parts.
10. Do not use vinyl tape in the engine compartment. The heat will tend to make it peel off. Use plated steel clips coated with rubber or vinyl.

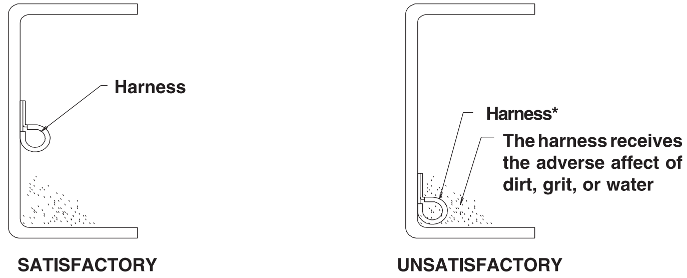
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)


Vinyl tube
Clip
Harness
Direct contact*
SATISFACTORY
UNSATISFACTORY

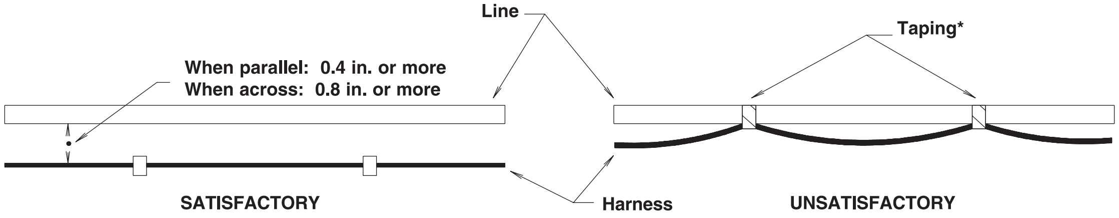

Rubber grommet
Steel plate
Electric wire
SATISFACTORY
UNSATISFACTORY

* Cables should not be in contact with sharp edges or pierced holes.


Harness
Harness*
The harness receives the adverse affect of dirt, grit, or water
SATISFACTORY
UNSATISFACTORY

* Harnesses should not be installed on inside lower face of the chassis frame.

* Harnesses should not be taped to fuel lines or other lines. A sufficient clearance should be maintained between harness and pipe lines.


Line
Taping*
When parallel: 0.4 in. or more
When across: 0.8 in. or more
Harness
SATISFACTORY
UNSATISFACTORY

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

Wire Color Code

The electrical circuits of the N/W and W Series Chassis Cab are connected with low-voltage stranded wire for automotive applications. The color coding standards are as follows for the N/W Series Chassis Cab:

(1)	Black	B	Starter circuits and grounds	(5)	Yellow	Y	Instrument circuit
(2)	White	W	Generator (alternator) circuit	(6)	Brown	Br	Accessory circuit
(3)	Red	R	Lighting circuit	(7)	Light Green	Lg	Other circuit
(4)	Green	G	Signal circuit	(8)	Blue	L	Windshield wiper motor circuit

Maximum Allowable Current

Harness Design Diameter (mm)	AWG Equivalent	No. of Wires/Wire Diameter (mm)	Cross Sectional Area (mm^2)	Maximum Allowable Current (Amps)
100	00	217/0.80	109.1	363
85	0	169/0.80	84.96	305
60	1	127/0.80	63.84	248
50	1	108/0.80	54.29	223
40	1	85/0.80	42.73	191
30	2	70/0.80	35.19	171
20	4	41/0.80	20.61	123
15	6	84/0.45	13.36	93
8	8	50/0.45	7.952	68
5	8	65/0.32	5.228	51
3	12	41/0.32	3.297	39
2	14	26/0.32	2.091	29
1.25	16	16/0.32	1.287	21
0.85	18	11/0.32	0.8846	17
0.5	20	7/0.32	0.5629	13

Reference: The values given in the “maximum allowable current” column are based on the ambient temperature condition of 104ºF with temperature increase of 104ºF.

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Electrical System Modifications

Modifications/add-on wiring must be carefully reviewed to ensure compatibility with the base vehicle wiring by reviewing system schematics, wire routing paths, harness connections, etc. Due to the wide range of modifications that may be required for vocational needs, it is not feasible for the O.E.M. to take into account all potential revisions. For this reason, any person modifying existing vehicle wiring must assume responsibility that the revisions have not degraded the electrical system performance. Any add-on wiring needs to be properly fused and routed to prevent cut, pinch, and chafe problems, as well as avoid exposure to excessive heat. Care must be exercised that existing vehicle interfaces do not have their current load capabilities exceeded, and that the respective control devices are not overloaded. Added wire size should be at least as large as the wire to which it is attaching in order for fuse protection to be maintained

A Packard electric wiring repair kit is available through Kent-Moore (P/N J38125-B) (Phone # 1-800-345-2233). This kit contains instructions, tools and components for making repairs to wiring harness components. This kit would also greatly assist in accomplishing necessary add-on wiring such as body marker lamps, so that system reliability/durability is maintained.

Electrical wiring components can be obtained through your authorized GM/Isuzu dealers. Packard Electric components are also available through Power and Signal (www.powerandsignal.com). Power and Signal may also be able to assist in making necessary wiring additions by providing custom wiring stubs or jumpers to your specifications.

Exhaust System

Modification of the exhaust system should be avoided. If modifications are absolutely necessary, the following points should be maintained.

1. Maintain the clearance specified in the "Exhaust System" table between all parts of the exhaust system and any fuel lines, brake lines, brake hoses, electrical cables, etc. The exhaust outlet should not point toward any of these parts.

	Clearance
Brake lines	2.4 in. or more. (If the combined section of a group of parallel brake lines is more than 7.8 in., a clearance of 7 in. or more should be provided.)
Flexible brake hoses	3.9 in. or more. (The temperature of flexible brake hoses should not exceed 158ºF. If the highest temperature is not measurable, a clearance of more than 15.7 in. should be maintained between the hoses and the exhaust system.)
Wiring harnesses and cables	3.9 in. or more.
Steel fuel lines	3.1 in. or more.
Rubber or vinyl fuel hoses	5.9 in. or more.

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(Installation of Body and Special Equipment Section – continued from previous page)

2. If a tool box is installed, it should preferably be made from steel. If a wooden tool box is installed, at least 7.8 inches of clearance should be maintained between the tool box and any parts of the exhaust system.
3. If the exhaust system is modified, it is the responsibility of those making the modification to ensure that the noise level meets appropriate standards.
4. If the exhaust system is modified it is the responsibility of those making the modification to ensure that the emission levels meet appropriate standards.

Fuel System

Relocation of the fuel tank, or installation of additional fuel tanks, is not recommended. If modifications to the fuel system are unavoidable, follow these recommendations:

1. Maintain adequate clearance between the fuel tank and any other device or structure.
2. Do not connect any additional fuel hose.

Rear Lighting

Brackets installed are temporary. Please do not use these brackets for body installation.

Serviceability

No matter what other modifications or changes are made, access to components requiring daily preventive maintenance or other routine service must not be obstructed. This includes:

1. Inspection, filling and draining of engine oil and cooling water.
2. Inspection, filling and draining of transmission fluid.
3. Adjustment, removal and installation of the fan belts.
4. Inspection, filling and removal of the battery and battery cover.
5. Inspection and filling of brake fluid.
6. Inspection and bleeding of the brake system and servo unit.
7. Maintenance of clearance for tightening of check bolt on brake safety cylinder.
8. Operation of the spare tire carrier, including mounting and dismounting of the spare tire.
9. Adjustment, removal and installation of distributor and/or cover.

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Wheelbase Alteration

With certain applications, it may become necessary to alter the wheelbase of the chassis. The next two sections provide the suggested guidelines for accomplishing either shortening or lengthening of the wheelbase.

Shortening/Lengthening the Wheelbase Without Altering the Frame

Since the frame is an integral part of the chassis, it is recommended that the frame not be cut if it is possible to avoid it. When shortening/lengthening the wheelbase on some models, it is possible to do so without cutting the frame. This is possible on models which have a straight frame rail. If the chassis does not have a straight frame rail, it may still be necessary to cut the frame. For instructions on shortening/lengthening these chassis, refer to the "Altering the Wheelbase by Altering the Frame" section of this book. Otherwise, the wheelbase may be shortened/lengthened by removing the rear suspension, drilling new suspension mounting holes at the appropriate spot in the frame, and sliding the rear suspension, suspension liner, and suspension crossmembers forward or aft. The suspension and suspension crossmembers' rivet holes left in the frame rail flange must be filled with GRADE 8 bolts and hardened steel washers at both the bolt head and nut, HUC bolts or GRADE 8 flanged bolts and hardened steel washers at the nut. When shortening/lengthening the wheelbase in this manner, the following guidelines must be adhered to:

1. All frame drilling must comply with the DRILLING AND WELDING section of this book.
2. All rivet holes left in the frame rail flange from the suspension and suspension crossmembers must be either filled with GRADE 8 bolts and hardened steel washers at both the bolt head and nut, HUC bolts or GRADE 8 flanged bolts and hardened steel washers at the nut.
3. The components required to be slid forward or aft are the suspension and suspension hangers, suspension crossmembers and suspension frame liner.

Altering the Wheelbase by Altering the Frame

Even on a straight frame rail, it may be desirable to cut the frame and lengthen or shorten the wheelbase rather than simply sliding the rear suspension back or forward. The following section offers some guidelines and suggestions for cutting and lengthening or shortening the frame.

Glossary of Terms – Chassis Wheelbase Alteration

CA – Length from back-of-cab to rear axle centerline in inches.
AL – Added length (in case of a lengthened wheelbase). Difference between WB (new) and WB (old).
SL – Shortened length (in case of shortened wheelbase). Difference between WB (old) and WB (new).

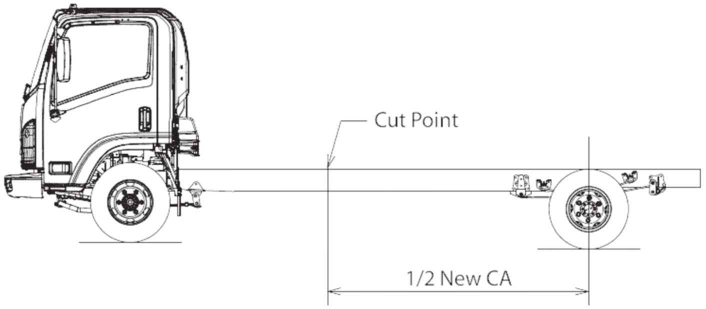
(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

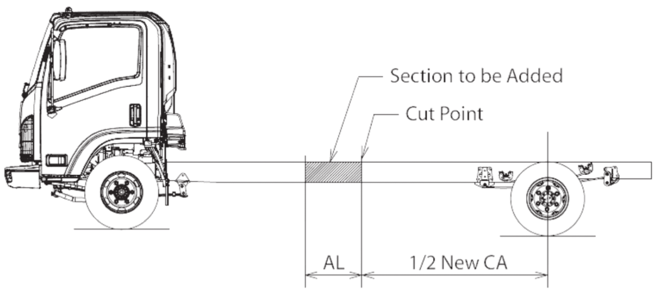
1. Determine the added length (AL) or shortened length (SL) required to lengthen or shorten chassis. (For added wheelbase: New CA = CA + AL; For shortened wheelbase: New CA = CA – SL.)

2. Obtain the material to be used as the insert for the lengthened wheelbase in the correct length (AL). The insert must have the same cross sectional dimensions and yield strength as the original frame rail.

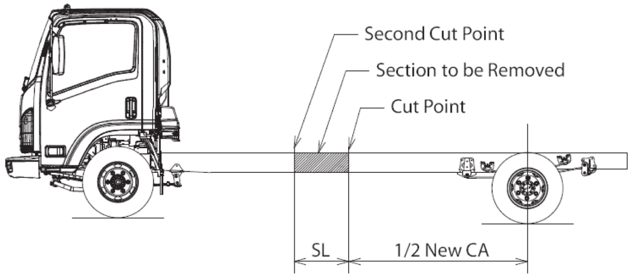
3. Divide the new CA by two (2). Measure (new CA)/2 from the center of the rear axle forward and mark this point on the chassis frame (see figure below).



4. Cut the chassis frame at this point. If the wheelbase is to be lengthened, addition of the previously obtained insert (of length AL determined in step 1) will be made at this time. If the wheelbase is to be shortened, measure the distance (SL) forward of this cut and remove a length (SL) section from the chassis frame (see figure below). Insure that an adequate area on the frame remains for the required addition of the necessary reinforcements. These are the only suggested places for cutting the frame and reinforcements but may be changed upon the advice of General Motors Isuzu Commercial Truck, LLC (GMICT) and Isuzu Commercial Trucks of America, Inc. Application Engineering.



Lengthening the Wheelbase

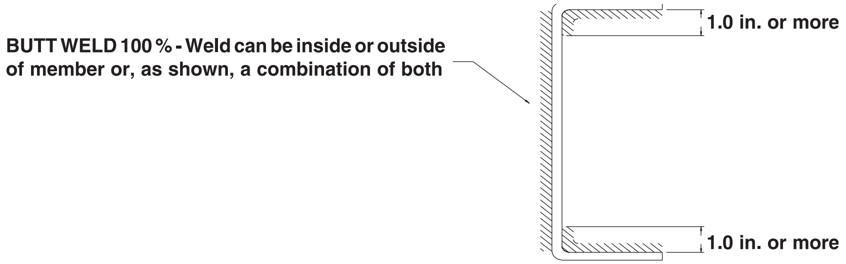


Shortening the Wheelbase

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

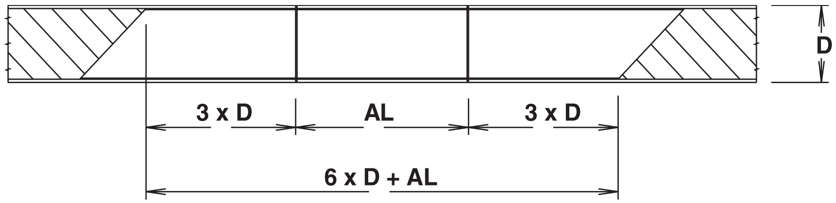
5. When welding the insert (length AL for wheelbase lengthening) to the original frame rail, a continuous butt weld must be used at the splices. When shortening the wheelbase, weld the ends of the chassis frame together with a continuous butt weld over the junction of the frame ends. Weld both the inside and outside of the frame rails using welding techniques prescribed by established welding standards (ref. SAE J1147) and in accordance with this guide. An example of this weld is shown below.


BUTT WELD 100 % - Weld can be inside or outside of member or, as shown, a combination of both
1.0 in. or more
1.0 in. or more

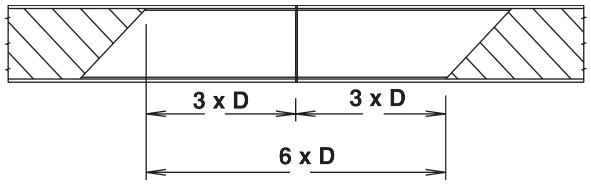
6. Determine the appropriate additional internal reinforcements which are required using this equation:

   Reinforcement Length = AL + 6 x (original frame rail web depth).

   The figure below shows how this reinforcement is to be placed over the extended or shortened section of the frame rail.



Lengthened Wheelbase



Shortened Wheelbase

D = Original frame rail web depth

The suggested cross section of this reinforcement is a snug fit inner channel. If the new wheelbase exceeds the upper limit of the optional wheelbases of this model, i.e.; a “long bridge”, it may be necessary to use an “inverted L” reinforcement in addition to the snug fit channel reinforcement (see figures on next page). Application Engineering should be consulted for approval of such cases. It should be noted that these methods of reinforcements, and any other methods which may be used, require a 45° angled cut at both ends to avoid stress concentrations in the frame (note the figures under item 7).

(Installation of Body and Special Equipment Section – continued on next page)

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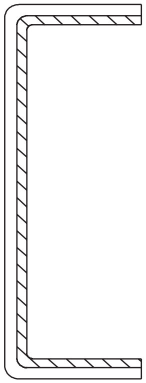
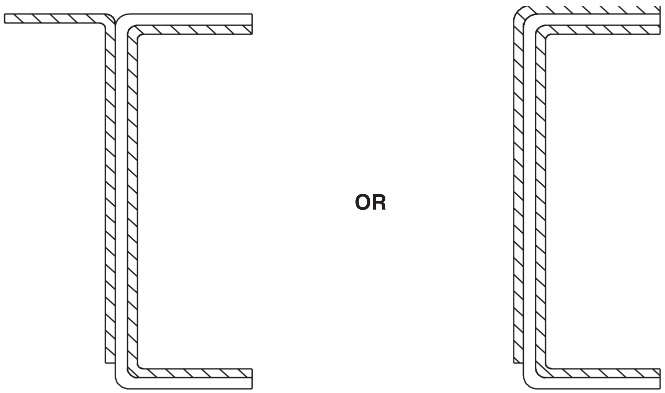
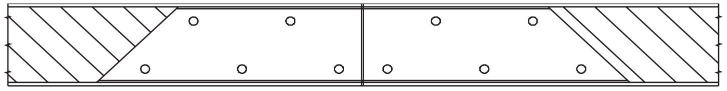


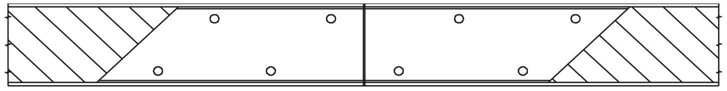
Snug fit inner channel



Snug fit inner channel with "Inverted L" for "Long Bridge" wheelbases

7. The reinforcements must be fastened securely to only the web of the original chassis frame rail. The reinforcement must be held rigidly in place using either HUC bolts, GRADE 8 bolts and hardened steel washers at both the bolt head and nut, or GRADE 8 flanged bolts and hardened steel washers at the nut. Below are some suggested bolt patterns. It should be noted that these bolt patterns must not align the bolts vertically, i.e.: the bolt pattern must be staggered.





8. Lengthening the frame will also require extending the brake lines, basic chassis electrical harness, excluding ABS wiring harness. It is recommended that the original brake lines be removed and replaced with brake lines of the same diameter as the original lines and of the appropriate length. The extended ABS brake lines must be supported back to the frame to prevent vibration. The electrical harness must be extended in accordance with the ELECTRICAL WIRING AND HARNESSING section of this book. The ABS wiring harnesses must not be cut. GMICT offers ABS extension harnesses for the N and W series chassis when a wheelbase is lengthened. One wheelbase longer is the recommended maximum wheelbase extension (please refer to the drive line section and particular models for number of drivelines and their maximum lengths). The extension of a wheelbase will require 2 ABS extension harnesses (pn 8972193550) and 10 clips (pn 5097090120).

9. The propeller shafts' overall length will also need to be lengthened or shortened. If the extension is within the limits of the optional wheelbases of the respective model, the exact propeller shaft lengths and angles are given on or about Page 12 of the respective sections of this book. If the modified wheelbase exceeds the optional wheelbases of the respective model, the following guidelines must be adhered to:

(Installation of Body and Special Equipment Section – continued on next page)

(Installation of Body and Special Equipment Section – continued from previous page)

a. Propeller Shaft Length

The maximum propeller shaft lengths (pin to pin) for the respective models are shown in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NRR/W5500-HD
Propeller Shaft Diameter (in.)	3.54	3.54	3.54	3.54
Maximum Propeller Shaft Length (in.)	52.9	52.9	52.9	52.9

b. Propeller Shaft Angles

The maximum propeller shaft angles, with respect to the previous shaft, are shown in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NRR/W5500-HD
Maximum Propeller Shaft Angle	6.1°	6.1°	6.1°	6.1°

c. The propeller shaft angles must be designed such that the angles will cancel to avoid propeller shaft whip.

d. The propeller shaft yokes must be assembled such that the propeller shaft yokes are “in phase.” “In phase” means that the yokes at either end of a given propeller shaft assembly are in the same plane.

10. Extending the frame will also require relocation and/or addition of crossmembers. If the extension is within the limits of the optional wheelbases of the respective model, the exact crossmember locations and dimensions are given in the respective model sections of this book. If the modified wheelbase exceeds the optional wheelbases of the respective model, the following guidelines must be adhered to:

a. The crossmember location will largely be determined by the propeller shaft lengths and where the center carrier bearing locations are for the propeller shaft assembly.

b. A crossmember must be located at the front and rear spring hangers of the rear suspension (refer to the appropriate section of this book to see where these suspension crossmembers are to be located).

c. The crossmember must be constructed such that it supports both the upper and lower flange on each frame rail (see drawing on next page). A crossmember such as the one on the next page may be constructed, or GM/Isuzu crossmembers may be obtained from your GM/Isuzu parts dealer.

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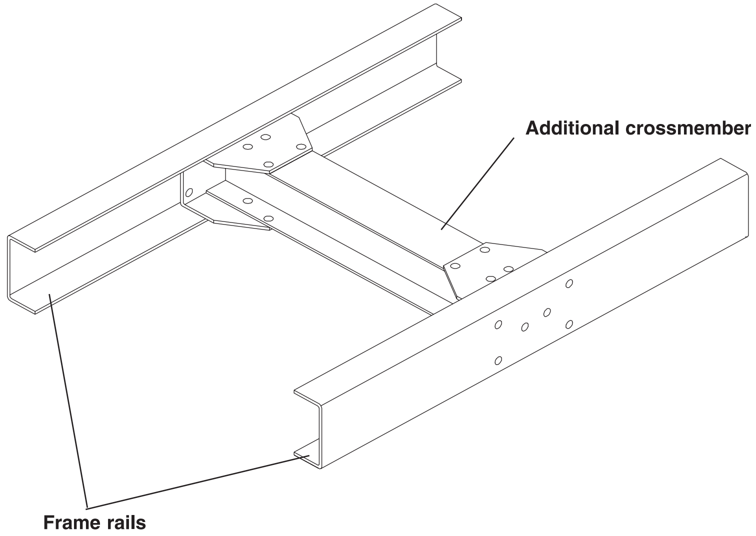


d. The maximum distance between crossmembers for the respective models is given in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NRR/W5500-HD
Maximum Distance Between Crossmembers (in.)	35.7	35.7	35.7	35.7

e. The drilling for any additional holes in the frame rails must comply with the DRILLING AND WELDING section of this book.

11. All other aspects of lengthening or shortening the wheelbase must comply with the applicable section of this Body Builder's Guide. For -special applications and longer than recommended body lengths, GMICT Application Engineering must be consulted for approval. In the West Coast call 1-562-229-5314 and in the East Coast call 1-678-240-9818.

12. Please contact applications engineering for guidelines on N/W SERIES CHASSIS frame modifications when the vehicle is equipped with an Antilock Brake System.

(Installation of Body and Special Equipment Section – continued on next page)

BODY APPLICATION SUMMARY CHART

2008 Gas and 2008 Diesel Model Body Application Summary Chart

Model/GVWR	WB	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.		
NPR/W3500 Gas 12,000 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Gas 14,500 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR/W3500 Diesel 12,000 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Diesel 14,500 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Crew Cab Diesel 14,500 lbs.	150	5.0		X[1]						
	176	5.0				X[2]				
NQR/W5500 Diesel 17,950 lbs.	109	6.5	X							
	132.5	6.5		X	X					
	150	6.5				X				
	176	6.5					X	X		

(2008 Model Year Body Application Summary Chart continued on next page)

1 = 16' Dovetail landscape (12' deck plus 4' dovetail).
2 = 18' Dovetail landscape (14' deck plus 4' dovetail).

IMPORTANT: Body selection recommendations are based on water-level weight distribution and no accessories, liftgate or refrigeration units. This table is intended for reference and does not preclude the necessity for an accurate weight distribution calculation.

(Body Application Summary Chart Section – continued on next page)

(Body Application Summary Chart Section – continued from previous page)

2008 Gas and 2008 Diesel Model Body Application Summary Chart *(Chart continued from previous page)*

Model/GVWR	WB	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.		
NQR/W5500 Crew Cab Diesel 17,950 lbs.	150	5.0		X[1]						
	176	5.0				X[2]				
NRR/W5500-HD Diesel 19,500 lbs.	109	6.5	X							
	132.5	6.5		X	X					
	150	6.5				X				
	176	6.5					X	X		

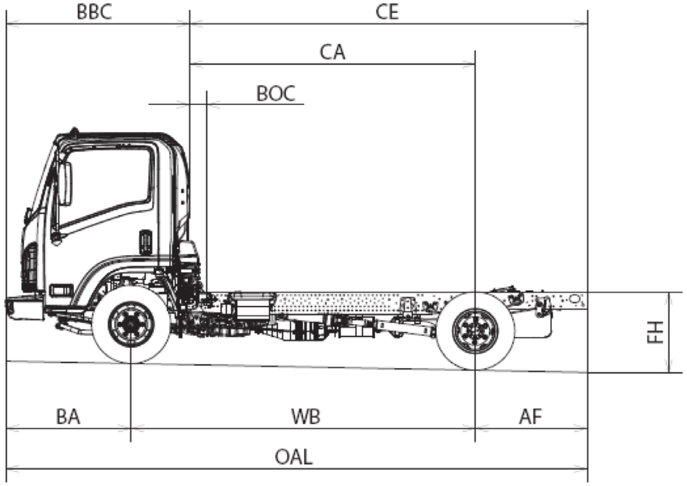
1=16' Dovetail landscape (12' deck plus 4' dovetail).
2 = 18' Dovetail landscape (14' deck plus 4' dovetail).

IMPORTANT: Body selection recommendations are based on water-level weight distribution and no accessories, liftgate or refrigeration units. This table is intended for reference and does not preclude the necessity for an accurate weight distribution calculation.

(Body Application Summary Chart Section – continued on next page)

(Body Application Summary Chart Section – continued from previous page)

NPR/W3500, NPR HD/W4500 Gas



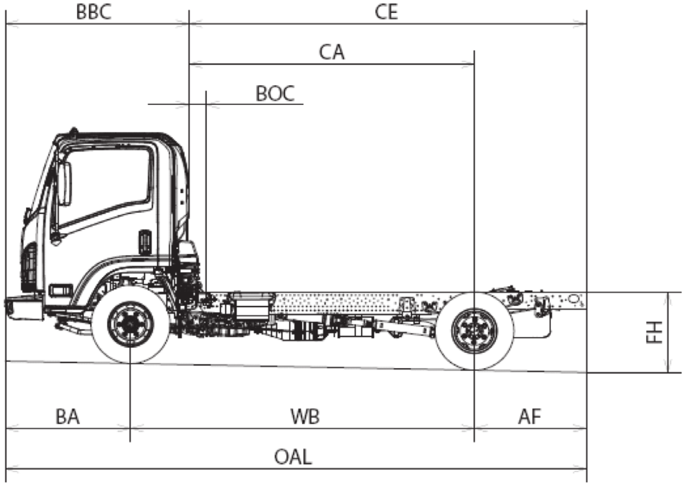
2008 Model Year - Body & Payload Weight Distribution (% Front/% Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.
NPR/W3500 Gas	12,000	109	86.5	129.6	200.5	6.5	18/82	7/93				
NPR HD/W4500 Gas	14,500	109	86.5	129.6	200.5	6.5	18/82	7/93				
NPR/W3500 Gas	12,000	132.5	110	153.1	224	6.5			14/86			
NPR HD/W4500 Gas	14,500	132.5	110	153.1	224	6.5			14/86			
NPR/W3500 Gas	12,000	150	127.5	170.6	241.5	6.5				16/84	8/92	
NPR HD/W4500 Gas	14,500	150	127.5	170.6	241.5	6.5				16/84	8/92	
NPR/W3500 Gas	12,000	176	153.5	196.6	267.5	6.5						15/85
NPR HD/W4500 Gas	14,500	176	153.5	196.6	267.5	6.5						15/85

(Body Application Summary Chart Section – continued on next page)

(Body Application Summary Chart – continued from previous page)

NPR/W3500, NPR HD/W4500 Diesel



2008 Model Year - Body & Payload Weight Distribution (% Front/% Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.
NPR/W3500 Diesel	12,000	109	86.5	129.6	200.5	6.50	18/82	7/93				
NPR HD/W4500 Diesel	14,500	109	86.5	129.6	200.5	6.50	18/82	7/93				
NPR/W3500 Diesel	12,000	132.5	110	153.1	224	6.50			15/85			
NPR HD/W4500 Diesel	14,500	132.5	110	153.1	224	6.50			15/85			
NPR/W3500 Diesel	12,000	150	127.5	170.6	241.5	6.50				17/83	9/91	
NPR HD/W4500 Diesel	14,500	150	127.5	170.6	241.5	6.50				17/83	9/91	
NPR/W3500 Diesel	12,000	176	153.5	196.6	267.5	6.50						15/85
NPR HD/W4500 Diesel	14,500	176	153.5	196.6	267.5	6.50						15/85

(Body Application Summary Chart Section – continued on next page)

(Body Application Summary Chart Section – continued from previous page)

NQR/W5500 Diesel

2008 Model Year - Body & Payload Weight Distribution (% Front/% Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	
NQR/W5500 Diesel	17,950	109	86.5	129.6	200.5	6.5	18/82	7.93					
NQR/W5500 Diesel	17,950	132.5	110	153.1	224	6.5			15/85				
NQR/W5500 Diesel	17,950	150	127.5	170.6	241.5	6.5				17/83	9/91		
NQR/W5500 Diesel	17,950	176	153.5	196.6	267.5	6.5						15/85	

IMPORTANT: Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.

NRR/W5500 HD Diesel

2008 Model Year - Body & Payload Weight Distribution (% Front/% Rear)

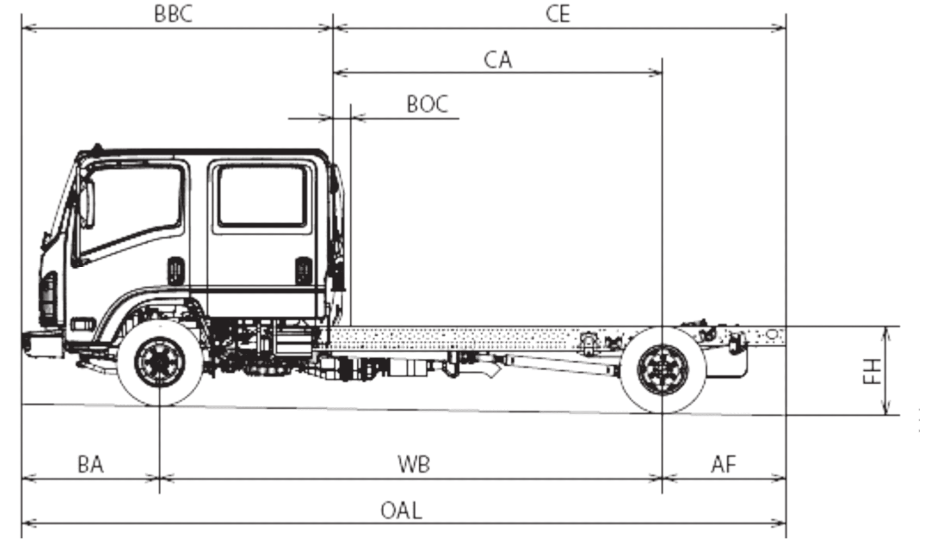
Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	
NRR/W5500-HD Diesel	19,500	109	86.5	129.6	200.5	6.50	18/82						
NRR/W5500-HD Diesel	19,500	132.5	110	153.1	224	6.50		24/76	16/84				
NRR/W5500-HD Diesel	19,500	150	127.5	170.6	241.5	6.50				18/82			
NRR/W5500-HD Diesel	19,500	176	153.5	196.6	267.5	6.50					22/78	16/84	

IMPORTANT: Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.

(Body Application Summary Chart Section – continued on next page)

(Body Application Summary Chart – continued from previous page)

NPR HD/W4500, NQR/W5500 Crew Cab Diesel



2008 Model Year - Diesel Crew Cab Body & Payload Weight Distribution (% Front/% Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.
NPR HD/W4500 Crew Cab Diesel	14,500	150	88.5	131.6	241.5	5		8/92		
NPR HD/W4500 Crew Cab Diesel	14,500	176	114.5	157.6	267.5	5				15/85
NQR/W5500 Crew Cab Diesel	17,950	150	88.5	131.6	241.5	5		8/92		
NQR/W5500 Crew Cab Diesel	17,950	176	114.5	157.6	267.5	5				8/92

IMPORTANT: Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver and a crew of 6 @ 200 lbs. each) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.

(Body Application Summary Chart Section – continued on next page)

MECHANICAL AND CAB SPECIFICATIONS

Engine Horsepower and Torque Chart

The following table presents Net versus Gross Horsepower and Torque ratings for Isuzu/W-Series Truck Product Engines:

Engine Model	Application	Net Hp[1] hp/rpm	Net Torque[1] lbs.-ft./rpm	Gross Hp[1] hp/rpm	Gross Torque[1] lbs.-ft./rpm
GMPT 6.0L-V8	NPR/W3500, NPR HD/W4500 Gas	N/A	N/A	300/4400	360/4000
Isuzu 4HK1-TC Automatic Transmission	NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel	193/2400	414/1850	205/2400	441/1850

NOTE: [1] Horsepower and Torque Ratings measured under SAE J1349 standards.

GVW/GCW Ratings

The following table presents GVW ratings and corresponding GCW ratings for each model truck:

Truck Model	Transmission	GVWR (lbs.)	GCWR (lbs.)[1]
NPR/W3500 Gas	Automatic	12,000	18,000
NPR HD/W4500 Gas	Automatic	14,500	20,500
NPR/W3500 Diesel	Automatic	12,000	18,000
NPR/W4500 Diesel	Automatic	14,500	20,500
NPR HD/W5500 Diesel	Automatic	17,950	23,950
NPR HD/W5500 HD Diesel	Automatic	19,500	25,500

[1] The NPR, NPR HD, NQR, NRR/W3500, W4500, W5500, W5500-HD are not approved for Hot Shot applications.

(Mechanical and Cab Specifications Section – continued on next page)

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Rear Frame Height Chart

The following table provides the rear frame height for each model/GVWR with standard tires:

Model	GVWR (lbs.)	Standard Tire	Frame HT (in.) FH Std. Tires
NPR/W3500 Gas	12,000	215/85R-16E	31.8
NPR HD/W4500 Gas	14,500	225/70R-19.5F	33
NPR/W3500 Diesel	12,000	215/85R-16E	31.8*
NPR HD/W4500 Diesel	14,500	215/85R-16E	31.8*
NQR/W5500 Diesel	17,950	225/70R-19.5F	33
NRR/W5500-HD Diesel	19,500	225/70R-19.5F	33

* with side tank = 31.8

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Paint Code Chart

MODEL	MODEL YEARS	ISUZU OPTION CODE	ISUZU PAINT CODE	ISUZU COLOR NAME	NOTES
KS22	1985	N/A	CALM WHITE	0133-P1	
NPR DIESEL	1986-95	844	GLACIER WHITE	0172-P1	
NPR , NQR NRR DIESEL	1995.5-2008	729	ARC WHITE	W301-P801-0	
		730	ADRIATIC BLUE	B302-P801-0	1999 MODEL ONLY
		845	POLAR SILVER	N507-P901-0	NPR SILVER
		989	SUNBELT GREEN	G021-P801-0	
NPR GAS	1993-94	844	GLACIER WHITE	0172-P1	
NPR GAS	1995.5-2007	729	ARC WHITE	W301-P801-0	
			ACCURIDE WHITE	301-W-30102	WHEELS ONLY
		845	POLAR SILVER	N507-P901-0	
		989	SUNBELT GREEN	G021-P801-0	
		736	CARDINAL RED	R410-P801-0	
NRR	1989-94	844	GLACIER WHITE	0172-P1	
FRR	1995-03	844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	

MODEL	MODEL YEARS	ISUZU OPTION CODE	ISUZU PAINT CODE	ISUZU COLOR NAME	NOTES
FSR	1987-02	729	ARC WHITE	W301-P801-0	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
FTR	1988-02	729	ARC WHITE	W301-P801-0	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
FVR	1988-02	729	ARC WHITE	W301-P801-0	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
EVR	1988-92	844	GLACIER WHITE	0172-P1	

(Mechanical and Cab Specifications Section – continued on next page)

(Mechanical and Cab Specifications Section – continued from previous page)

Paint Code Chart (continued)

ISUZU PAINT CODE	ISUZU OPTION CODE	ISUZU COLOR NAME	AKZO NOBEL CODE	DUPONT CODE	NEXA COLOR CODE	PPG CODE	SHERWIN WILLIAMS/ MARTIN SENOUR	SPIES HECKER CODE	STANDOX CODE
W301-P801-0	729	Arc White	IST4002	729	2NV8B	91508	729	729	729
Y719-P801-0	812	Wheatland Yellow	IST1001	812	KPL7B	83931	812	812	812
G705-P801-0	807	Woodland Green	IST6002	807	KPL3B	48339	807	807	807
R410-P801-0	736	Cardinal Red	IST3001	736	5XA2B	75097	736	736	736
B414-P801-0	695	Dark Blue	IST5001	695	5CHCB	909649	695	695	695
K705-P801-0	508	Ebony Black II	IST4001	508	7DVVB	918055	508	508	508

(Mechanical and Cab Specifications Section – continued on next page)

(Mechanical and Cab Specifications Section – continued from previous page)

N/W Series Towing Procedure

NOTE: When towing, disconnect the driveshaft at the rear axle to ensure the automatic transmission is not damaged.

Proper equipment must be used to prevent damage to vehicles during any towing. State and local laws which apply to vehicles in tow must be followed. Vehicles should not be towed at speeds in excess of 55 mph (90 km/h). Connect to the main structural parts of the vehicle. DO NOT attach to bumpers, tow hooks or brackets. Use only equipment designed for this purpose. Follow the instructions of the wrecker manufacturer. A safety chain system must be used. The procedures below must be followed when towing to prevent possible damage.

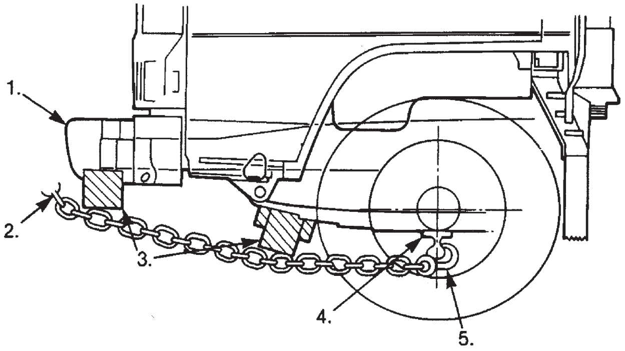
Front End Towing (Front Wheels Off the Ground)

To prepare a disabled vehicle for front end towing with front wheels raised off the ground, the following steps are necessary:

- Block the rear wheels of the disabled vehicle.
- Disconnect the diveshafts at the rear axle. Secure the driveshafts to the frame or crossmember.
- If there is damage or suspected damage to the rear axle, remove the axle shafts.
- Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.
- Place 4" x 4" wood beam against the towing guide behind the bumper. (If no 4" x 4" is available, then remove the bumper.) Ensure the towing chains do not contact the horns or the bumper.

Legend:

1. Bumper
2. Towing Chain
3. Towing Guide
4. Front Axle
5. Tow Hook



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After Towing
After towing the vehicle, block the rear wheels and install axle shafts or propeller shaft. Apply the parking brake before disconnecting from the towing vehicle.

Front End Towing (All Wheels On the Ground)

Your vehicle may be towed on all wheels provided the steering is operable. Remember that power steering and brakes will not have power assist. There must be a tow bar installed between the towing vehicle and the disabled vehicle.

To prepare a disabled vehicle for front end towing with all wheels on the ground, the following steps are necessary:

- Block the wheels of the disabled vehicle.
- Disconnect the propeller shafts at the rear axle. Secure the propeller shafts to the frame or crossmember.
- Provide wood blocking to prevent towing chains and bar from contacting the bumper.
- If there is damage or suspected damage to the rear axle, remove the axle shafts.
- Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

After Towing
After towing the vehicle, block the rear wheels and install axle shafts or propeller shaft. Apply the parking brake before disconnecting from the towing vehicle. Check and fill rear axle with oil if required.

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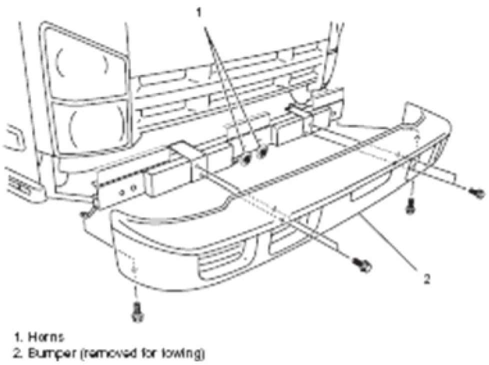

Legend:

1. Horns
2. Bumper
   (removed for towing)

Rear End Towing (Rear Wheels Off the Ground)

When towing a vehicle with rear wheels raised, secure the steering wheel to maintain straight-ahead position. Make certain that the front axle is not loaded above the front axle Gross Axle Weight Rating (GAWR) as indicated on the vehicle's VIN and Weight Rating plate.

(Mechanical and Cab Specifications Section – continued on next page)

(Mechanical and Cab Specifications Section – continued from previous page)

Special Towing Instructions:

1. All state and local laws regarding such items as warning signals, night illumination, speed, etc., must be followed.
2. Safety chains must be used.
3. No vehicle should ever be towed over 55 mph (90 km/h).
4. Loose or protruding parts of damaged vehicles should be secured prior to moving.
5. A safety chain system completely independent of the primary lifting and towing attachment must be used.
6. Operators should refrain from going under a vehicle which is being lifted by the towing equipment unless the vehicle is adequately supported by safety stands.
7. No towing operation which for any reason jeopardizes the safety of the wrecker operator or any bystanders or other motorists should be attempted.

WEIGHT DISTRIBUTION CONCEPTS

Weight Restrictions

The Gross Vehicle Weight Rating (GVWR) and the Gross Axle Weight Rating (GAWR) of each Incomplete Vehicle are specified on the cover of its Incomplete Vehicle Document in conformance to the requirements of Part 568.4 of the Federal Motor Vehicle Safety Regulations. The final stage manufacturer is responsible under Part 567.5 to place the GVWR and the GAWR of each axle on the Final Vehicle Certification Label. The regulation states that the appropriate rating "shall not be less than the sum of the unloaded vehicle weight, rated cargo load, and 150 pounds times the vehicle's designated seating capacity."

Unloaded vehicle weight means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants.

During completion of this vehicle, GVWR and GAWR may be affected in various ways, including but not limited to the following:

1. The installation of a body or equipment that exceeds the rated capacities of this Incomplete Vehicle.
2. The addition of designated seating positions which exceeds the rated capacities of this Incomplete Vehicle.
3. Alterations or substitution of any components such as axles, springs, tires, wheels, frame, steering and brake systems that may affect the rated capacities of this Incomplete Vehicle.

Use the following chart to assure compliance with the regulations. Chassis curb weight and GVW rating is located on Page 2 in each vehicle section. Always verify the results by weighing the completed vehicle on a certified scale.

Curb Weight of Chassis (lbs.) ____________
(From required vehicle section)

PLUS weight of added body components, accessories or other permanently attached components. + ____________
(Body, liftgate, reefer, etc.)

PLUS total weight of passengers, air conditioning and all load or cargo. + ____________
(Driver, passengers, accessories and load)

EQUALS Gross Vehicle Weight (lbs.) (GVW) of completed vehicle. = ____________
(Should equal GVWR from required vehicle section)

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Gross Axle Weight Rating

The Gross Vehicle Weight is further restricted by the Gross Axle Weight Rating (GAWR). The maximum GAWR for both front and rear axles is listed in each Vehicle Section. Weight distribution calculations must be performed to ensure GAWR is not exceeded. Always verify the results by weighing the completed vehicle on a certified scale.

NOTE: Although the Front Gross Axle Weight Rating (FGAWR) plus the Rear Gross Axle Weight Rating (RGAWR) may exceed the Gross Vehicle Weight Rating (GVWR), the total GVW may not exceed the respective maximum GVWR.

The variation in the GAWRs allow the second stage manufacturer some flexibility in the design of the weight distribution of the attached unit.

Weighing the Vehicle

Front and rear GAWRs and total GVWR should be verified by weighing a completed loaded vehicle. Weigh the front and rear of the vehicle separately and combine the weights for the total GVWR. All three weights must be less than the respective maximum shown in the vehicle sections.

Tire Inflation

Tire inflation must be compatible with GAWR and GVWR as specified on the cover of the Incomplete Vehicle Document for each vehicle.

Center of Gravity

The design of the truck body should be such that the center of gravity of the added load does not exceed the guidelines as listed in each Vehicle Section. If the body is mounted in such a way that the center of gravity height exceeds the maximum height of the center of gravity designated for each model, the directional stability at braking and roll stability at cornering will be adversely affected. A vertical and/or horizontal center of gravity calculation must be performed if a question in stability arises to ensure the designed maximum height of the center of gravity is not violated.

(Weight Distribution Concepts Section – continued on next page)

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Weight Distribution

A truck as a commercial vehicle has but one purpose. That purpose is to haul some commodity from one place to another. A short distance or a long distance, the weight to be hauled, more than any other factor, determines the size of the truck. A small weight requires only a small truck; a large weight requires a large truck. A simple principle, but it can easily be misapplied. In any case, selecting the right size truck for the load to be hauled will ensure that the job will be done and that it will be able to be done with some degree of reliability and within the legal limitations of total gross weight and axle gross weights.

Not only must a truck be selected that will handle the total load, but the weight must also be properly distributed between the axles. This is of extreme importance from both a functional and economic aspect. If a truck consistently hauls less than its capacity, the owner is not realizing full return on his investment and his operating costs will be higher than they should be. If the truck is improperly loaded or overloaded, profits will be reduced due to increased maintenance costs and potential fines resulting from overloading beyond legal limitations. Careful consideration must be given to distribution of the load weight in order to determine how much of the total, including chassis, cab, body and payload, will be carried on the front axle and how much will be carried on the rear axle, on the trailer axles and the total. Moving a load a few inches forward or backward on the chassis can mean the difference between acceptable weight distribution for the truck or an application that will not do the job satisfactorily.

Every truck has a specific capacity and should be loaded so that the load distribution is kept within Gross Axle Weight Ratings (GAWR) and the truck's Gross Vehicle Weight Rating (GVWR) or Gross Combination Weight Rating (GCWR) for a tractor/trailer and the weight laws and regulations under which the truck will operate. Improper weight distribution will cause problems in many areas:

1. Excessive front end wear and failure
    a. Tie-rod and kingpin wear
    b. Front axle failure
    c. Overloading of front suspension
    d. Wheel bearing failure
2. Rapid tire wear
    a. When the weight on a tire exceeds its rating capacity, accelerated wear will result and could result in tire failure.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

3. Rough, erratic ride
   a. If the center of the payload is directly over or slightly behind the rear axle, the lack of sufficient weight on the front axle will create a bobbing effect, very rough ride, and erratic steering. This condition will be magnified when the truck is going uphill.
4. Hard steering
   a. When loads beyond the capacity of the front axle are imposed upon it, the steering mechanism is also overloaded and hard steering will result.
   b. Excessive overloading could result in steering component damage or failure.
5. Unsafe operating and conditions
   a. Poor traction on the steering axle effects the safety of the driver and equipment, particularly on wet, icy and slippery surfaces. Experience indicates that approximately 30% of the total weight at the ground on a truck or tractor should be on the front axle with a low cab forward vehicle.
   b. When a truck is overloaded, a dangerous situation may exist because minimum speeds cannot always be maintained, directional control may not be precise and insufficient braking capacity can cause longer than normal braking distances.
6. High maintenance costs
   a. Improper weight distribution and overloading cause excessive wear and premature failure of parts. Additional stresses imposed on the frame by the misapplication of wheelbases may be instrumental in causing the frame to crack or break.
7. Noncompliance with weight laws and regulations
   a. When there is the possibility that axle loads will exceed existing weight laws and regulations, careful weight distribution is necessary to provide a correct balance between front and rear axle loads and total load within legal limitations.

In this way, maximum payloads may be carried without exceeding legal limits. If the body is too long for a wheelbase, the center of the body and payload is placed directly over the rear axle. This places all the payload on the rear axles, resulting in overloading the rear tires, rear axle springs and wheel bearings and potentially exceeding the rear axle legal weight limit. The front axle is then carrying no part of the payload and is easily lifted off the ground when going over rough terrain, creating a very rough ride and temporary loss of steering control. If the body is too short for the wheelbase used, frame stress may be increased and may result in excessive loads on the front axle. Excessive front axle loads increase wear on the kingpins and bushings, wheel bearings and steering gear. Excessive front axle loads also overstress the front axle, springs, tires and wheels. All of these contribute directly to higher maintenance costs and hard steering, both of which are undesirable.

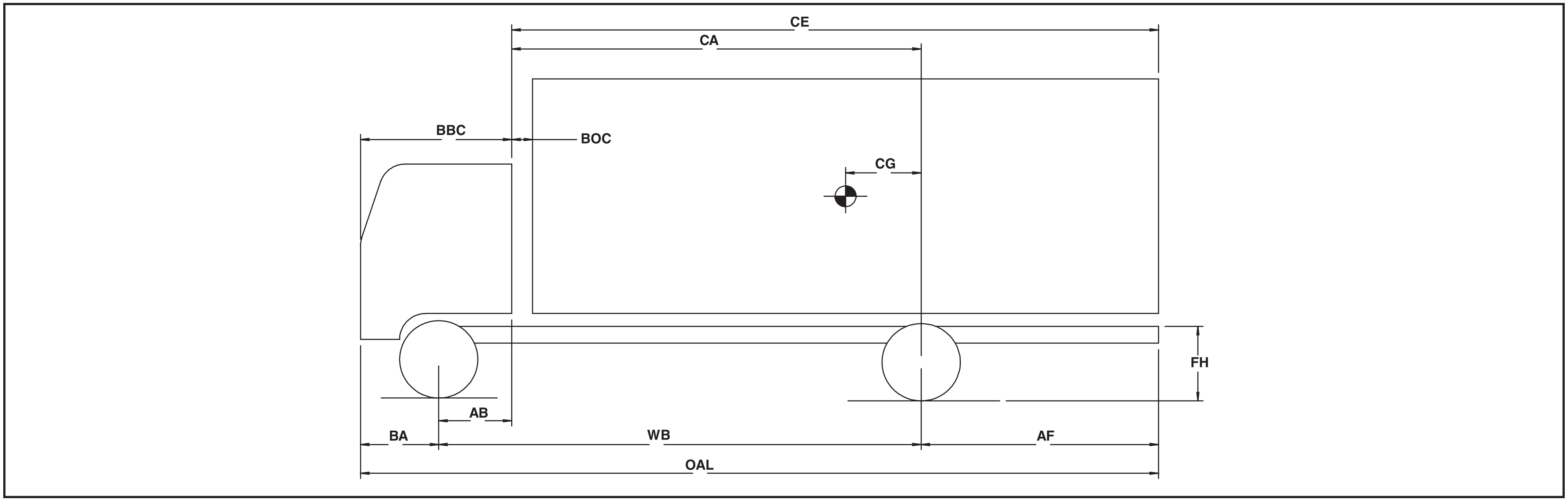
(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Weight distribution analysis involves the application of basic mathematical principles to determine the proper positioning of the payload and body weight in relation to the wheelbase of the truck chassis.

It is much less expensive to work all of this out on paper, make mistakes on paper and correct them there than to set up the truck incorrectly and either have it fail to do the job or, much worse, fail completely.

It is important to become familiar with the dimensions of the truck, as these will be needed to perform the necessary calculations.



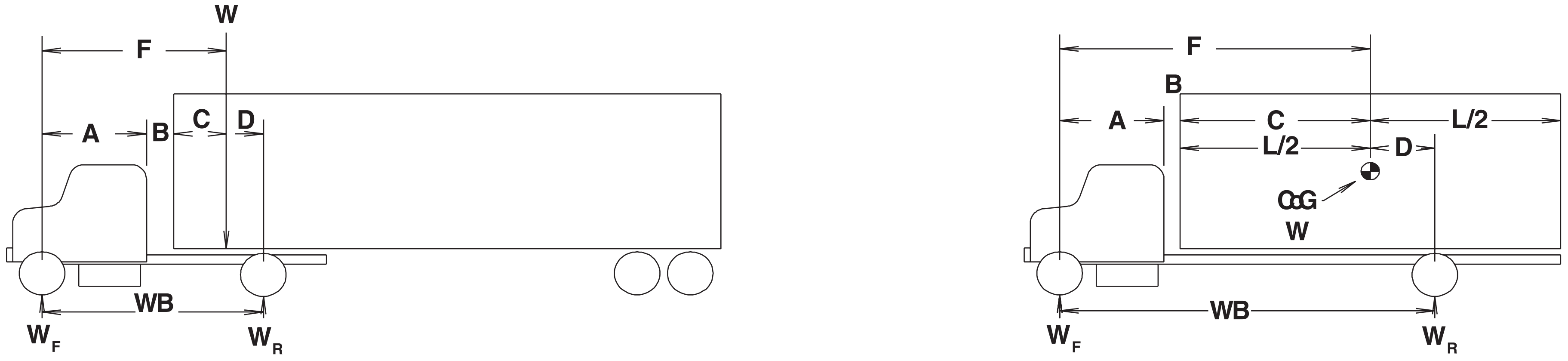
Glossary of Dimensions

BBC – Bumper to back of cab
BA – Bumper to axle
CA – Cab to axle
AB – Axle to back of cab
BOC – Back of cab clearance
CE – Cab to end of frame
CG – Center of gravity of body and payload from axle
WB – Wheelbase
OAL – Overall length
AF – Axle to end of frame
FH – Frame height

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Weight Distribution Formulas



A – Front axle to back of cab

B – Distance between cab and body or trailer

C – Front of body to C.G. or front of trailer to kingpin

D – Distance C.G. of body or fifth wheel is ahead of rear axle

F – (A + B + C) or distance C.G. of weight of fifth wheel is behind front axle

WB – Wheelbase

W – Weight of body plus payload, or kingpin load

W_f – Portion of W transferred to front axle

W_r – Portion of W transferred to rear axle

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Basic Formulas

(a) $W \times D = W_f \times WB$

or

(b) $W \times F = W_r \times WB$

(c) $WB = (A + B + C + D) = (F + D)$

(d) $W = W_f \times W_r$

1. $W_f = \dfrac{W \times D}{WB}$

2. $D = \dfrac{W_f \times WB}{W}$

3. $WB = \dfrac{W \times D}{W_f}$

4. $W = \dfrac{W_f \times WB}{D}$

5. $W_r = \dfrac{W \times F}{WB}$

6. $F = \dfrac{W_r \times WB}{W}$

7. $WB = \dfrac{W \times F}{W_r}$

8. $W = \dfrac{W_r \times WB}{F}$

Weight Distribution Formulas in Words

To find:

1. Weight transferred to front axle = $\dfrac{\text{(Total weight) x (Distance C.G. is ahead of the rear axle)}}{\text{(Wheelbase)}}$

2. Distance C.G. must be placed ahead of rear axle = $\dfrac{\text{(Weight transferred to the front axle) x (Wheelbase)}}{\text{(Total weight)}}$

3. Wheelbase = $\dfrac{\text{(Total weight) x (Distance C.G. is ahead of the rear axle)}}{\text{(Weight to be transferred to the front axle)}}$

4. Total Weight = $\dfrac{\text{(Weight to be transferred to the front axle) x (Wheelbase)}}{\text{(Distance C.G. is ahead of the rear axle)}}$

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

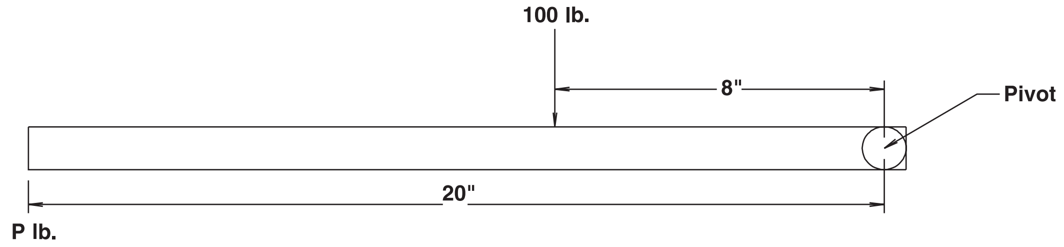
5. $$\text{Weight transferred to the rear axle} = \frac{\text{(Total weight) x (Distance C.G. is behind the front axle)}}{\text{(Wheelbase)}}$$

6. $$\text{Distance C.G. must be placed behind the front axle} = \frac{\text{(Weight transferred to the rear axle) x (Wheelbase)}}{\text{(Total weight)}}$$

7. $$\text{Wheelbase} = \frac{\text{(Total weight) x (Distance C.G. is behind the front axle)}}{\text{(Weight to be transferred to the rear axle)}}$$

8. $$\text{Total weight} = \frac{\text{(Weight to be transferred to the rear axle) x (Wheelbase)}}{\text{(Distance C.G. is behind the front axle)}}$$

9. Remember = Total weight must always equal weight transferred to the rear axle plus the weight transferred to the front axle



To find the value of “P”, the leverages must be equal for balance.

Example: 100 lbs. x 8 in. = “P” x 20 in.

or $$\text{“P”} = \frac{\text{100 lbs. x 8 in.}}{\text{20 in.}}$$

Therefore: “P” = 40 lbs.

This same approach is used to determine axle loadings on a tractor or truck chassis. Assuming the rear axle serves as a pivot point, the front axle load can be determined by applying the lever principle.

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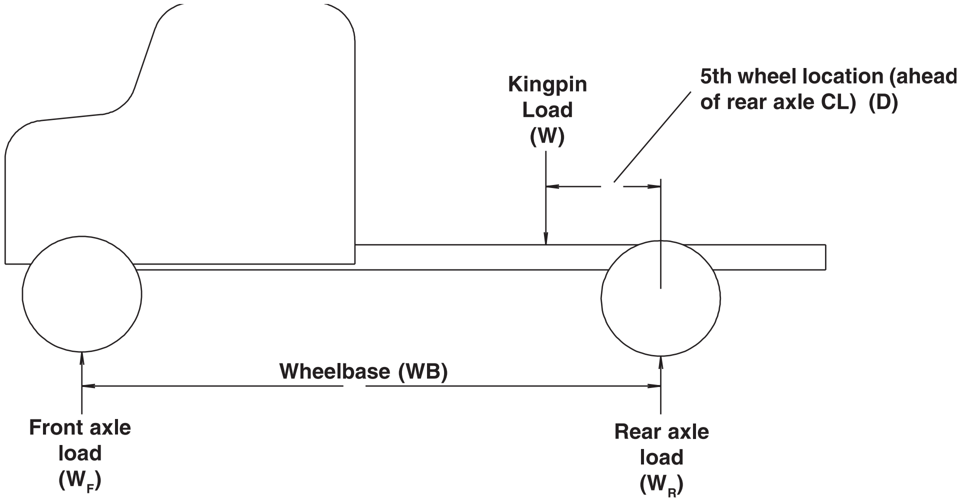

Kingpin Load (W)
5th wheel location (ahead of rear axle CL) (D)
Wheelbase (WB)
Front axle load (W_F)
Rear axle load (W_R)

Front Axle Load: = Kingpin Load x 5th Wheel Location / Wheelbase

Rear Axle Load: = Kingpin Load – Front Axle Load

Example: (4) A tractor has a wheelbase of 150 inches. If the kingpin load is 20,000 lbs. and the fifth wheel location is 15 inches, find the total weight on the front and rear axles. The tare weight of the tractor is 7,000 lbs. on the front axle and 4,400 lbs. on the rear axle.

Front Axle = Load
20,000 x 15 / 150 = 2,000 lbs.
WB

Rear Axle Load = 20,000 – 2,000 lbs. = 18,000 lbs.

Therefore:
Total Front Axle Weight = 2,000 + 9,000 lbs. = 11,000 lbs.
Total Rear Axle Weight = 4,400 + 18,000 lbs. = 22,400 lbs.

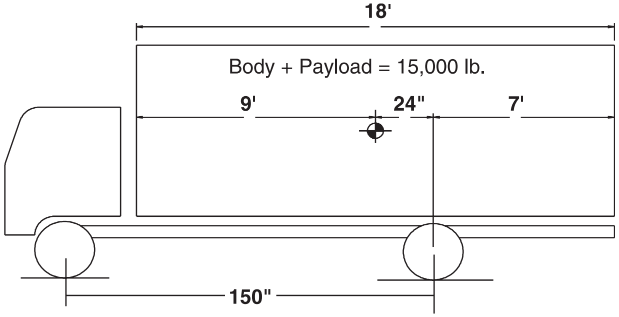
(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

In calculating the weight distribution for a truck, the same lever principle is applied; however, there is one change in the initial consideration of the method of loading the truck body. Instead of the trailer kingpin location ahead of the rear axle centerline, we must determine the position of the center of gravity of the payload and body weight in relation to the rear axle centerline.

For our calculations, we assume that the payload is distributed in the truck body so that the load is supported evenly over the truck body floor (water-level distribution). The weight of the body itself is also considered to be evenly distributed along the truck frame. In this manner, we can add the payload and body weights together and calculate the distribution on the vehicle chassis as an evenly distributed load on the truck frame rails.

So that we can make the necessary calculation in a simple manner, the total body and payload weight is considered to act at the center of gravity which will be at the center of the body length.



Example:

$$\text{Front Axle Load} = \frac{\text{(Body Weight + Payload)} \times \text{C of G location}}{\text{Wheelbase}}$$

Rear Axle Load =
(Body Weight + Payload) – Front Axle Load

Therefore, Front Axle Load =

$$\frac{15{,}000 \times 24}{150} = 2{,}400 \text{ lbs.}$$

Rear Axle Load = 15,000 – 2,400 = 12,600 lbs.

(Weight Distribution Concepts Section – continued on next page)

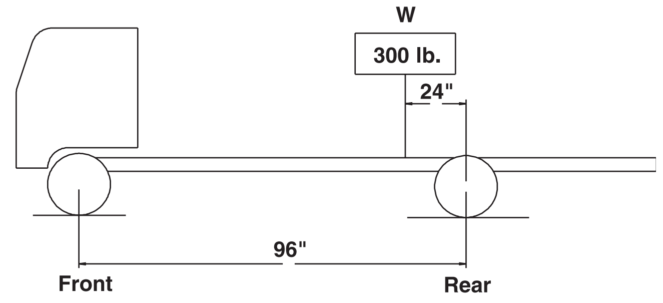
(Weight Distribution Concepts Section – continued from previous page)

If the truck tare weight without the body is 5,000 lbs. on the front axle and 2,400 lbs. on the rear axle, then
Total Front Axle Weight = 5,000 + 2,400 = 7,400 lbs. and
Total Rear Axle Weight = 2,400 + 12,600 = 15,000 lbs.

This same lever principle is applied in all calculations of weight distribution, whether we are dealing with concentrated loads as with a kingpin load acting on a fifth wheel or if it be with an evenly distributed load as with a truck body. The same approach is made in calculating an evenly distributed load on a trailer.

In the case of a tractor/trailer or a tractor with a set of double or triple trailers, each unit is handled as a separated unit and then combined to determine the total.

This simple example illustrates how the principles are applied. Using the formulas, find the weight distributed to each axle.



	Front Weight		**Rear Weight**
A.	$W_f = \frac{W \times D}{WB}$	A.	Total Weight –
B.	$\frac{300 \times 24}{96}$	B.	300 – 75
C.	= 75 lbs.	C.	= 225 lbs.

The body manufacturer can provide the body length and weight, or actual measurements of the body may be taken with a tape. Generally, (D) is unknown. This you must find logically, or with a tape measure.

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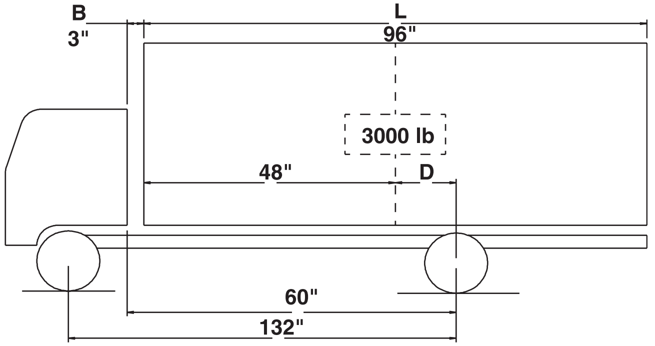
Find (D) and then solve for W_f and W_r.



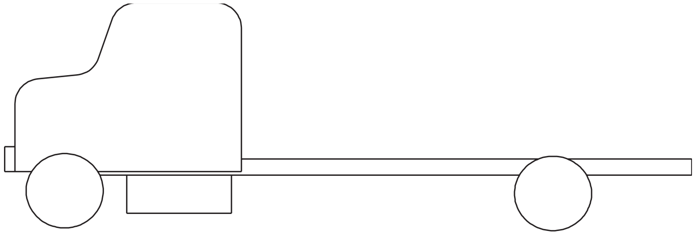
D = 60–3–48 = 9 in.

W_f = 205

W_r = 2,795

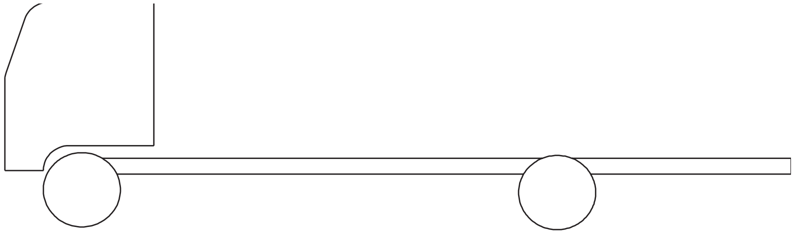
Recommended Weight Distribution % of Gross Vehicle Weight by Axle

Conventional (2 Axle)



	Front Axle	Rear Axle
Desired	25%	75%
Permissible	20-30%	70-80%

COE (2 Axle)

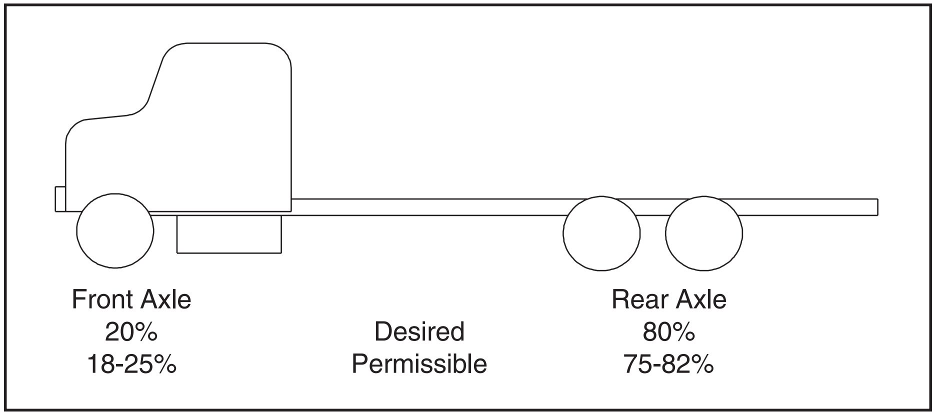


	Front Axle	Rear Axle
Desired	33 1/3%	66 2/3%
Permissible	30-35%	65-70%

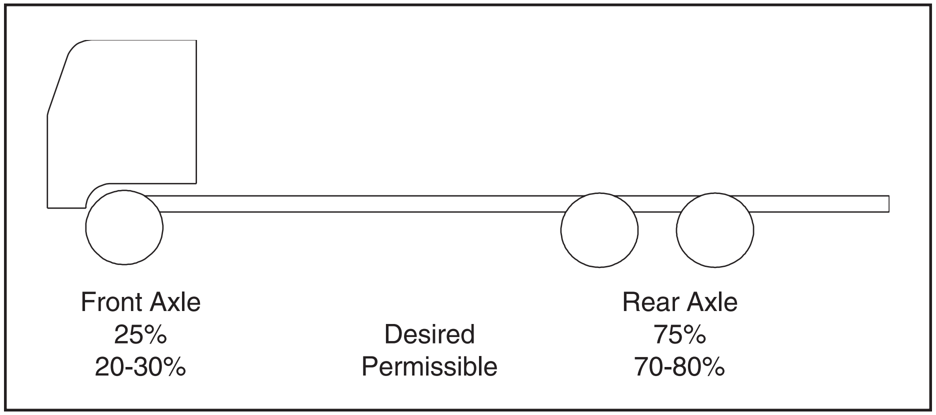
(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

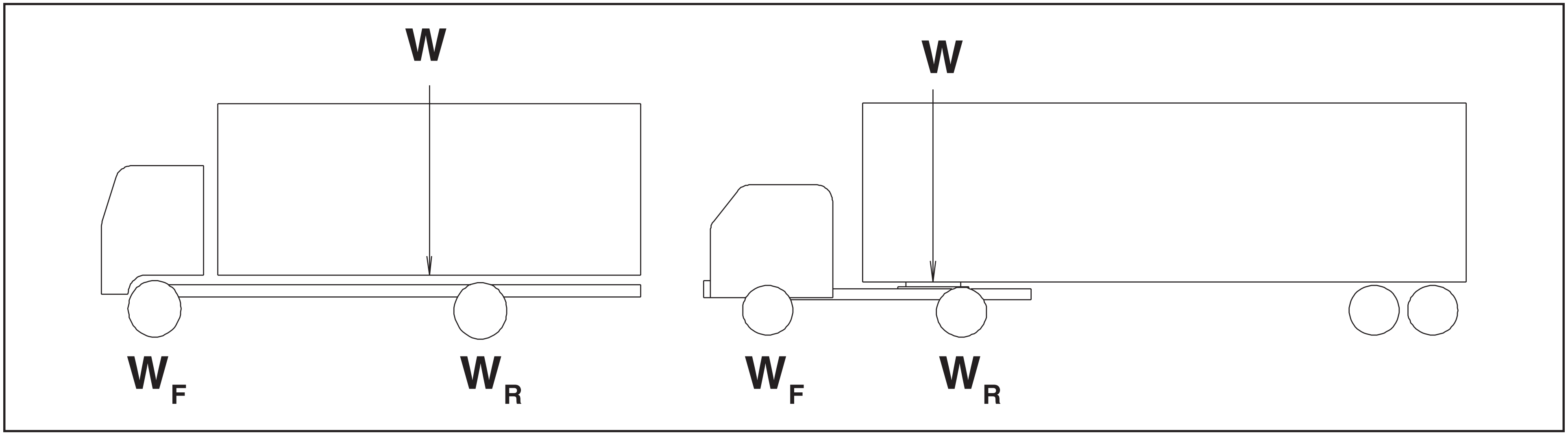
Conventional (3 Axle)


Front Axle
20%
18-25%
Desired
Permissible
Rear Axle
80%
75-82%

COE (3 Axle)


Front Axle
25%
20-30%
Desired
Permissible
Rear Axle
75%
70-80%

Calculating tractor/trailer weight distribution can be thought of in the same terms as calculating full trucks.

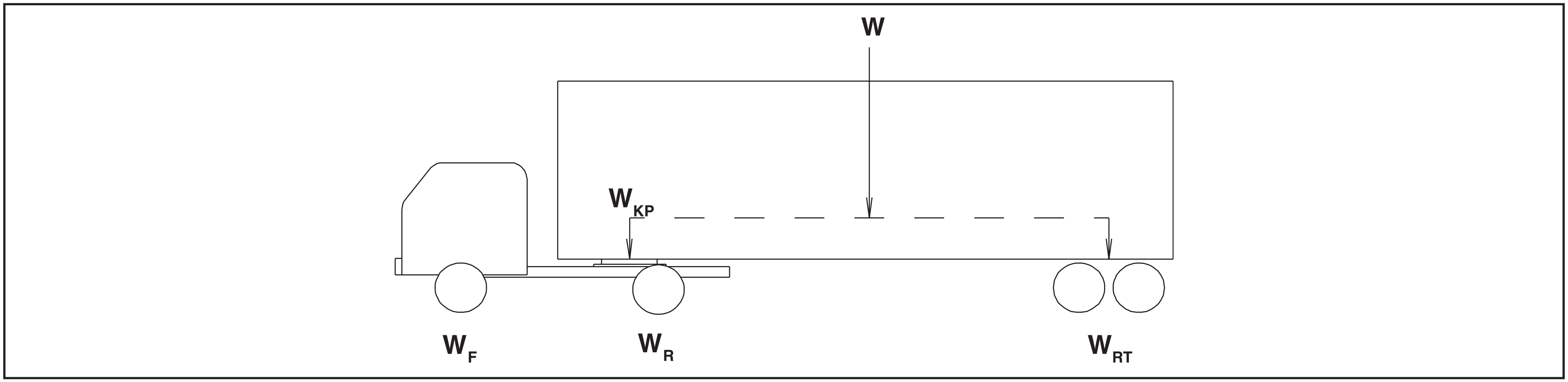

W
W
W_F
W_R
W_F
W_R

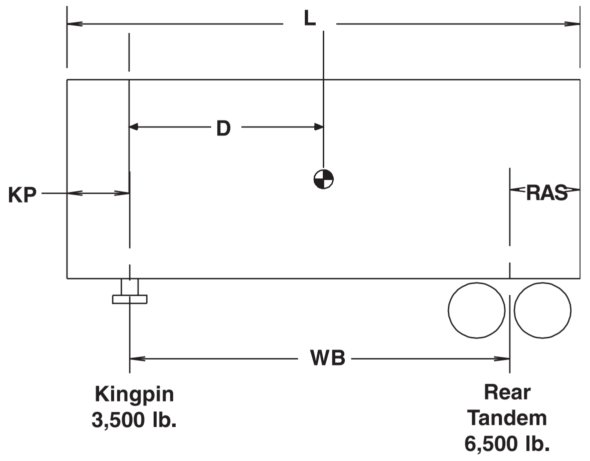
The weight at the center of the body and the load when applied is the same as the single point load of the kingpin on the fifth wheel.

(Weight Distribution Concepts Section – continued on next page)

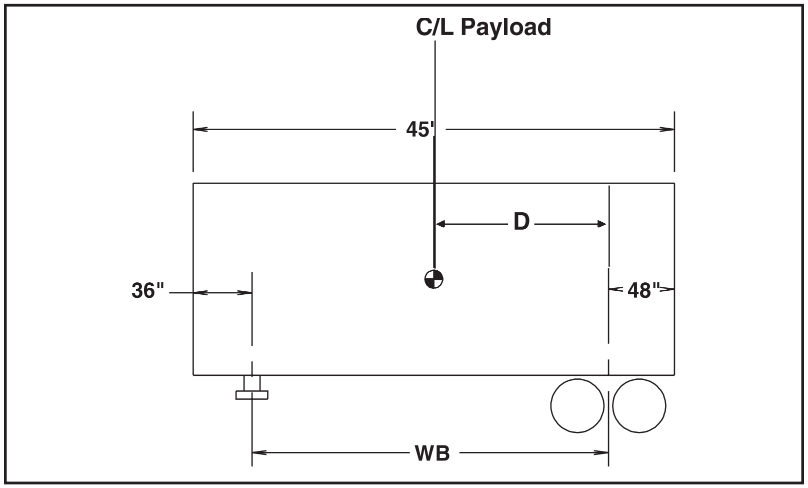
(Weight Distribution Concepts Section – continued from previous page)

Trailer Weight


W
W_{KP}
W_F
W_R
W_{RT}


L
D
KP
RAS
WB
Kingpin
3,500 lb.
Rear
Tandem
6,500 lb.

Fill in: L = 40 feet
RAS = 48 inches
KP = 36 inches
WB = ? 396
D = ? 204


C/L Payload
45'
D
36"
48"
WB

In the following example, a 50,000-pound payload at water-level loading. Calculate the payload (PL) weight transfer to kingpin and the rear axle.

NOTE: Apply the same principles used with truck chassis.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Payload at Kingpin

$$\mathbf{PL_{kp} = \frac{W \times D}{WB}}$$

Calculate the "D" dimension.

OAL/2 – AF = D
45 feet/2 – 48 inches – 36 inches = 186 inches

$$PL_{kp} = \frac{50{,}000 \text{ lbs.} \times 186 \text{ in.}}{456 \text{ in.}} = 20{,}394 \text{ lbs.}$$

$$\mathbf{PL_{kp} = \underline{20{,}394 \text{ lbs.}}}$$

Payload at Rear Tandem

$$\mathbf{PL_{rt} = W - PL_{kp}}$$

$$PL_{rt} = 50{,}000 \text{ lbs.} - 20{,}394 \text{ lbs.} = 29{,}606 \text{ lbs.}$$

$$\mathbf{PL_{rt} = \underline{29{,}606 \text{ lbs.}}}$$

Once the weight on the kingpin is determined, it can then be treated on the tractor the same as a weight on a straight truck.

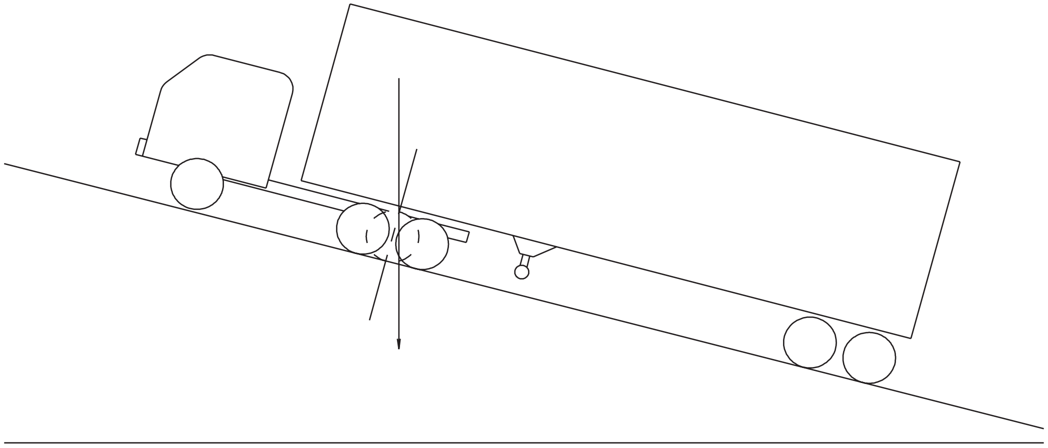
Due to the variations in hauling and wheelbase requirements from one truck application to another, there is no one specific fifth wheel setting that will apply in all cases.

A "rule of thumb" which has proven satisfactory in many cases sets the fifth wheel one inch ahead of the rear axle for every 10 inches of wheelbase. In the case of tandem axles, the wheelbase is measured from the center line of the front axle to the midpoint between the tandem rear axles. The location of the fifth wheel fixes the load distribution between the front and rear axles. Too far forward and the front axle is overloaded. If too far back, the front axle may be too lightly loaded and cause an unsafe steering and braking control situation at the front axle.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

A tractor on a hill with the fifth wheel set at the axle center line or too close to it will result in an unsafe handling situation by transferring too much weight to the rear axle and actually unloading the front axle.



Performance Calculations

The following calculations have been included to help you determine the performance characteristics required by your customers and to select the appropriate model vehicle:

1. Speed Formula

This formula can be used to determine:

1. Top speed of the vehicle.
2. Speed in a given gear.
3. Final ratio required for a given speed.

$$\text{MPH @ Governed Speed} = \frac{(60) \times (\text{RPM})}{(\text{Rev/Mile}) \times (\text{Gear Ratio})}$$

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Definitions in formula:

RPM = Revolutions per minute of the engine at Governed Speed
Rev/Mile = Tire revolutions per mile
Gear Ratio = The product of the axle ratio times the transmission ratio
60 = Time Constant

Example: NPR/W3500 12,000 GVWR automatic transmission.

RPM = 3,000
Rev/Mile = 674
Gear Ratio = .703 x 5.375

$$\textbf{MPH @ Governed Speed} = \frac{(60) \times (3{,}000)}{(674) \times (.703 \times 5.375)}$$

MPH @ Governed Speed = 70 MPH

2. *Grade Horsepower Formula*

This formula can be used to determine horsepower required for a given grade and speed.

$$\textbf{Horsepower Req'd. for a given grade} = \frac{\text{GVWR} \times \text{Grade} \times \text{Speed}}{37{,}500 \times \text{Efficiency Factor}} + \text{AHP}$$

Definitions in formula:

GVWR = Gross Vehicle Weight Rating
Grade = Grade anticipated in percent
Speed = Speed in miles per hour
37,500 = Constant
Efficiency Factor = Factor for losses in drivetrain due to friction (use 0.9 for a 90% efficient driveline)
AHP Resistance = Horsepower required to overcome wind force

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Example: NPR/W3500 11,050 GVWR automatic transmission with a van body.

GVWR = 12,000 lbs.
Grade = 1 percent
Speed = 55 MPH
37,500 = Constant
Efficiency Factor = 0.9
AHP Resistance = 53.6 HP (see the following formula for calculation)

$$\textbf{HP Required for Grade} = \frac{12{,}000 \times 1 \times 55}{37{,}500 \times 0.9} + 53.67$$

HP Required for Grade = 73.22

3. *Air Resistance Horsepower Formula*

This formula is used to determine the horsepower required to overcome air resistance at a given speed.

$$\textbf{Air Resistance Horsepower} = \frac{FA \times Cd \times (MPH)^3}{156{,}000}$$

Definitions in formula:

FA = Frontal area of vehicle in square feet
Cd = Aerodynamic Drag Coefficient
MPH = Speed of vehicle in miles per hour
156,000 = Constant

Frontal area is calculated by multiplying the height of the vehicle by the width of the vehicle and subtracting the open area under the vehicle from the total.

Aerodynamic Drag Coefficients *(Source Material: Motor Truck Engineering Handbook):*

0.70	for most trucks, semitrailer combinations with tanks or van bodies
0.77	for double and triple trailers and flatbeds with loads
1.00	car and boat haulers

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Example: NPR/W3500 12,000 GVWR van body with 96" wide, 115" high (84" body height + 31" frame height).

$$\mathbf{FA} = \frac{(96) \times (115)}{(12) \times (12)} - 3.2$$

FA = 73.47 ft.^{2}
Cd = 0.70
Speed = 55 mph

$$\text{Air Resistance HP} = \frac{73.47 \times 0.70 \times (55)^3}{156{,}000}$$

$$\text{Air Resistance HP} = 54.85$$

4. Engine Horsepower Formula

This formula can be used to derive the output at a given RPM and torque.

$$\mathbf{Horsepower} = \frac{\text{Torque} \times \text{RPM}}{5{,}252}$$

Definitions in formula:

Torque = Twisting output of engine given in lbs.-ft.
RPM = Revolutions per minute of engine
5,252 = Constant

Example: NPR/W3500 12,000 GVWR automatic transmission.

Torque = 347 lbs.-ft.
RPM = 2,000

$$132 \text{ HP} = \frac{(347) \times (2{,}000)}{5{,}252}$$

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

5. Gradeability Formula

This formula can be used to determine how large of a grade a vehicle can climb.

$$\textbf{Percent Grade} = \frac{\textbf{1,200 x (T) x (E) x (C) x (R)}}{\textbf{GVWR x r}} - \textbf{RR}$$

Definitions in formula:

1,200 = Constant
T = Maximum Torque of Engine
E = Engine Efficiency (0.9)
C = Driveline Efficiency (0.9)
R = Transmission Ration x Axle Ratio
RR = Rolling Resistance (see following chart)
GVWR = Gross Vehicle Weight Rating
r = Loaded radius of tire

Example: NPR/W3500 12,000 GVWR automatic transmission on concrete highway.

T = 347 lbs.-ft.
E = 0.9
C = 0.9
R = .703 x 5.375 (in overdrive)
RR = 1.0
GVWR = 12,000
r = 14.1 in.

$$\textbf{Percent Grade} = \frac{\textbf{1,200 x (347) x (0.9) x (0.9) x (.703) x (5.375)}}{\textbf{12,000 x 14.1}} - \textbf{1.0}$$

Percent Grade = 6.53 – 1

Gradeability = 5.53%

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Road Rolling Resistance			
Road Rolling Resistance – Expressed in Percent Grade			
Road Surface	**Grade**	**Road Surface**	**Grade**
Concrete, excellent	1.0	Cobbles, ordinary	5.5
Concrete, good	1.5	Cobbles, poor	8.5
Concrete, poor	2.0	Snow, 2 inches	2.5
Asphalt, good	1.25	Snow, 4 inches	3.75
Asphalt, fair	1.75	Dirt, smooth	2.5
Asphalt, poor	2.25	Dirt, sandy	3.75
Macadam, good	1.5	Mud	3.75 to 15.0
Macadam, fair	2.25	Sand, level soft	6.0 to 15.0
Macadam, poor	3.75	Sand, dune	16.0 to 30.0

6. *Startability Formula*

This formula is used to determine what type of a grade a vehicle can be started on.

$$\textbf{Startability} = \frac{(1{,}200) \times (CET) \times (E) \times (C) \times (R)}{(GVWR \times r)} - 10\%$$

Definitions in formula:

1,200 = Constant
CET = Clutch Engagement Torque
E = 0.9
C = 0.9
R = Transmission x Axle Ratio
10% = Average break away resistance and static inertia constant
GVWR = Gross Vehicle Weight Rating
r = Loaded radius of tire

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Example: NPR/W3500 12,000 GVWR manual transmission.

CET = 260 lbs.-ft.
R = 6.02 x 4.10
GVWR = 12,000 lbs.
r = 14.1 in.

$$\text{Startability} = \frac{(1{,}200) \times (260) \times (0.9) \times (0.9) \times (6.02 \times 4.10)}{(12{,}000 \times 14.1)} - 10\%$$

$$\text{Startability} = 26.86\%$$

7. Vertical Center of Gravity Formula

These formulas are used to estimate the vertical center of gravity of a completed vehicle in order to determine whether maximum allowable limits have been exceeded. This formula should be used when encountering high center of gravity loads.

7.1 $Wv \times (Vv) = Mv$

7.2 $Wb \times (Vb) = Mb$

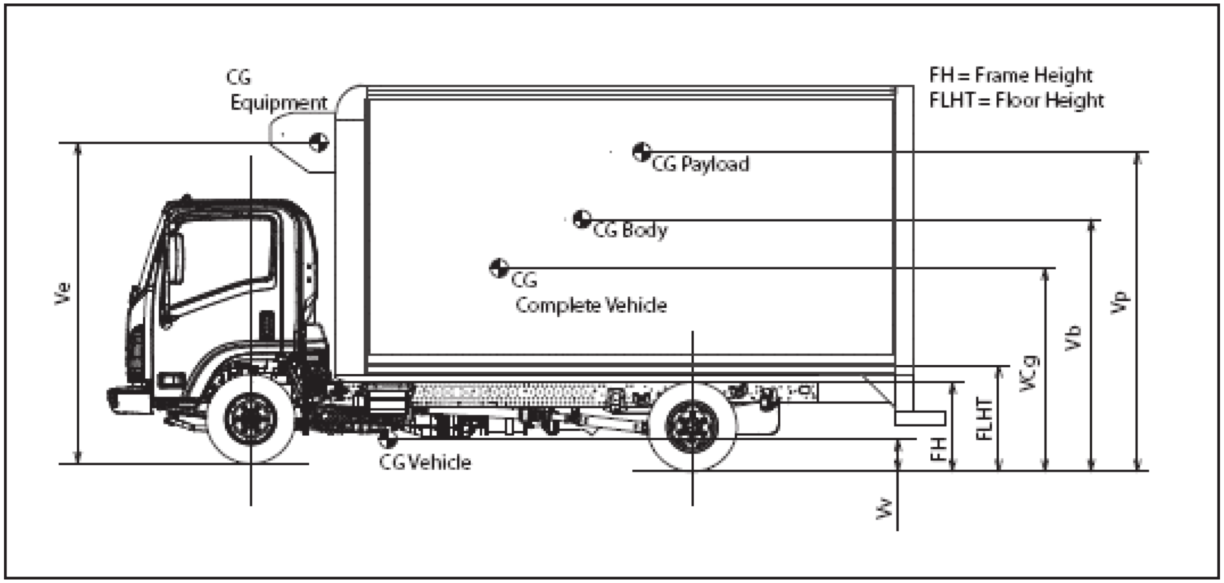
7.3 $Wp \times (Vp) = Mp$

7.4 $We \times (Ve) = Me$

7.5 **VCg** $$\mathbf{VCg} = \frac{(Mv + Mb + Mp + Me)}{(Wv + Wb + Wp + We)}$$

Definitions in formula:

VCg = The total average vertical center of gravity of the completed vehicle (vehicle, body, payload and equipment)
Wv = Weight of vehicle
Wb = Weight of body
Wp = Weight of payload
We = Weight of equipment


CG Equipment
FH = Frame Height
FLHT = Floor Height
CG Payload
CG Body
CG Complete Vehicle
CG Vehicle
Ve
Vp
Vb
VCg
FLHT
FH
Vv

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Definitions in formula *(continued)*:

Vv = Distance from ground to center of gravity of the vehicle
Vb = Distance from ground to center of gravity of the body
Vp = Distance from ground to center of gravity of the payload
Ve = Distance from ground to center of gravity of the equipment
Mv = Moment of vehicle
Mb = Moment of body
Mp = Moment of payload
Me = Moment of equipment

Example: NPR/W3500 12,000 GVWR automatic transmission, 132" WB, 14' body length, 84" high body, full payload of boxes stacked to a maximum height of 48" above the flooring.

Wv = 5,291 lbs. *(from vehicle specifications)*
Wb = 2,100 lbs. *(from body manufacturer)*
Wp = 4,609 lbs. *(GVWR – (Wv + Wb + We))*
Vv = 24.9 in. *(from Body Builder's Guide, NPR Section)*
Vb = 80 in. *(from body manufacturer)*
Vp = 62 in. *(1/2 of payload height + frame height + height from frame to flooring)*
Mv = 5,291 x 24.9 = 131,746 lbs.-in. *(from 7.1)*
Mb = 2,100 x 80 = 168,000 lbs.-in. *(from 7.2)*
Mp = 4,609 x 62 = 285,758 lbs.-in. *(from 7.3)*
We, Ve, Me = None in this example

$$VCg = \frac{(131{,}746 + 168{,}000 + 285{,}758)}{(5{,}291 + 2{,}100 + 4{,}609)}$$

$$VCg = \frac{(528{,}504)}{(12{,}000)} = 48.8 \text{ inches}$$

48.8 < 54.0 inches (54 inches is maximum allowable VCg per mfg. specifications from Body Builder's Guide, NPR/W3500 section)

Since maximum VCg for this truck is not exceeded, 48" stack height above flooring is acceptable.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

8. Horizontal Center of Gravity Formula

These formulas are used to estimate the horizontal center of gravity of a completed vehicle in order to determine whether it exists between the centerlines of the front and rear axles. This formula should be used when a load and/or permanent equipment (liftgate, reefer unit, snowplow, etc.) is installed on either extreme along the completed vehicle's overall length.

8.1 $Wv \times (Hv) = Mv$

8.2 $Wb \times (Hb) = Mb$

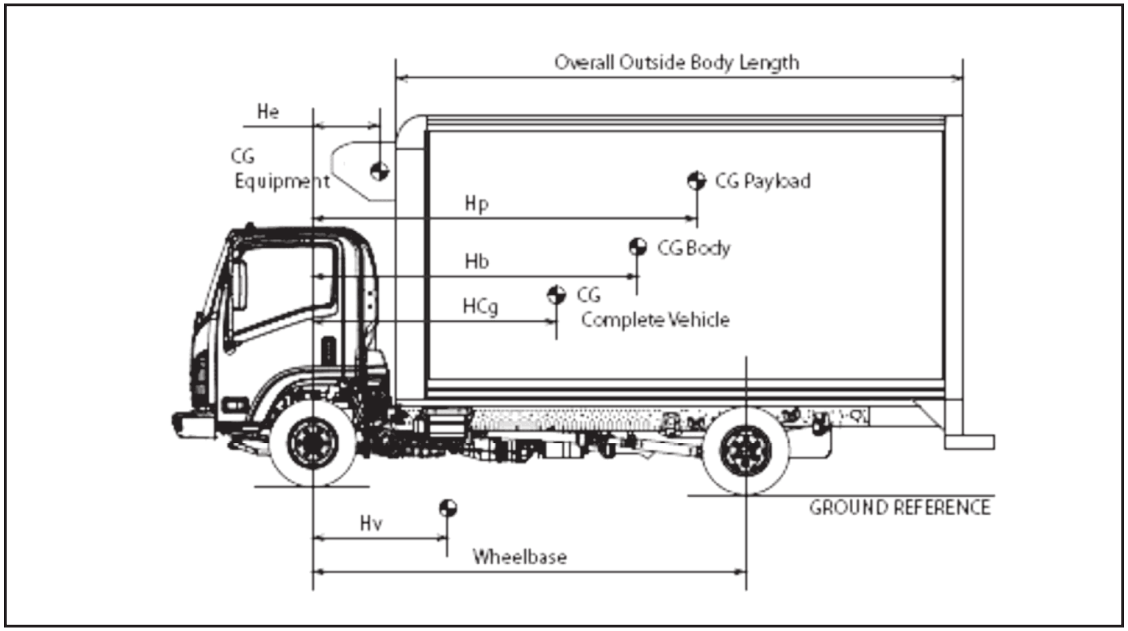
8.3 $Wp \times (Hp) = Mp$

8.4 $We \times (He) = Me$

8.5 $$\mathbf{HCg} = \frac{\mathbf{(Mv + Mb + Mp + Me)}}{\mathbf{(Wv + Wb + Wp + We)}}$$

Definitions in formula:

HCg = The total average horizontal center of gravity of the completed vehicle (vehicle, body, payload and equipment)
Wv = Weight of vehicle
Wb = Weight of body
Wp = Weight of payload
We = Weight of equipment
Hv = Distance from front axle to center of gravity of the vehicle
Hb = Distance from front axle to center of gravity of the body
Hp = Distance from front axle to center of gravity of the payload
He = Distance from front axle to center of gravity of the equipment
Mv = Moment of vehicle
Mb = Moment of body
Mp = Moment of payload
Me = Moment of equipment



(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Example: NPR/W3500 Diesel 12,000 GVWR automatic transmission, 132" WB, 14' body length, full payload of boxes stacked and distributed evenly throughout the flooring, 1,000 lb. reefer unit attached in front of body.

Wv = 5,291 lbs. *(from vehicle specifications)*

Wb = 2,100 lbs. *(from body manufacturer)*

Wp = 3,609 lbs. *(GVWR – (Wv + Wb + We))*

We = 1,000 lbs. *(from equipment manufacturer)*

Hv = 42.4 in. *(from Body Builder's Guide, NPR Section)*

Hb = 107.5 in. *(from body manufacturer)*

Hp* = 107.5 in. *(1/2 of payload length + distance from front axle to front of body)*

He = 17.5 in. *(from equipment manufacturer)*

Mv = 5,291 x 42.4 = 224,338 lbs.-in. *(from 8.1)*

Mb = 2,100 x 107.5 = 225,750 lbs.-in. *(from 8.2)*

Mp = 3,609 x 107.5 = 387,967 lbs.-in. *(from 8.3)*

Me = 1,000 x 17.5 = 17,500 lbs.-in. *(from 8.4)*

$$HCg = \frac{(224{,}338 + 225{,}750 + 387{,}967 + 17{,}500)}{(5{,}291 + 2{,}100 + 3{,}609 + 1{,}000)}$$

$$HCg = \frac{(855{,}555)}{(12{,}000)} = 71.3 \text{ inches}$$

71.3 < 132 inches (132 inches is the wheelbase dimension)

Since HCg for this truck is not greater than the WB or negative (–) (denotes HCg forward of front axle centerline), it exists between the centerlines of the front and rear axles.

NOTE: Hp and Hb dimensions are the same in this example because CG of body and payload happen to be at the same point.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Highway System Limits

The Federal Government established the Federal Bridge Gross Weight Formula to provide a standard to control the spacing of truck axles on trucks that use highway bridges. This is intended to space loads out over a distance to avoid too high a concentration in one area that could cause damage. The truck's gross weights, axle weight and axle spacings are set in order to keep axle loads and gross weight loads within the limits set by the Federal Government. The Bridge Formula Table is used to check trucks to make sure that Federal weight limit requirements are met and that the allowable gross and axle weights are in the correct relationship with the spacing of axles to prevent high load concentrations on highway bridges.

The Federal Government has established the following formula to be used to determine the allowable weight limits and axle spacings for trucks.

$$W = 500\left(\frac{LN}{N-1} + 12N = 36\right)$$

Where:

W = The total gross weight that may be carried on any group of two or more consecutive axles to the nearest 500 lbs.

L = The distance (spacing) in feet between the outer axles of any group of two or more consecutive axles.

N = The number of axles in the group under consideration; except that two consecutive sets of tandem axles may carry a gross load of 34,000 lbs. each provided the overall distance between the first and last axles of such consecutive sets of axles is 36 feet or more.

Bridge Formula Definitions

The following definitions are used for bridge formula calculations.

Gross Weight

The total weight of a truck (and/or trailer) combined with the weight of the load being hauled. The Federal gross weight limits on interstate highways and federal-aid highways and reasonable access is 80,000 lbs.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Single Axle Weight

The total weight at the ground by all wheels of an axle whose centers may be included between parallel transverse planes 40 inches apart, extending across the width of the truck. The Federal single axle weight limit on the interstate system and reasonable access is 20,000 lbs.

Tandem Axle Weight

The total weight at the ground of two or more consecutive axles whose centers may be included between parallel vertical planes spaced more than 40 inches but not more than 96 inches apart, extending across the full width of the truck. The Federal tandem axle weight limit on the interstate system and reasonable access is 34,000 lbs.

Consecutive Axle Weight

The Federal law states that any two or more consecutive axles may not exceed the weight as computed by the formula even though the single axles, tandem axles, and gross weights are within the legal requirements.

Exception to the Bridge Formula

There is one exception to the use of the Federal Bridge Formula: two consecutive sets of tandem axles may carry a gross load of 34,000 lbs. each, providing the overall distance between the first and last axles of such consecutive sets of tandem axles is 36 feet or more.

Other Federal Provisions

Maximum Width: 102 inches overall

Length: States cannot set overall length limits on tractor, semitrailer or tractor-semitrailer, trailer combinations. States must allow tractors with double trailers. States must allow semitrailers of up to 48 feet in length for doubles combinations. There is also not a limitation on overall length for semitrailer or doubles combinations.

These width and length dimensions apply to trucks operating on interstate highways and federal-aid highways designed by the Federal Highway Administration. This also provides for reasonable access to the interstate highways.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Federal Bridge Formula Table

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
4	34,000*							
5	34,000*							
6	34,000*							
7	34,000*							
8 and less	34,000*	34,000						
8 and more	38,000	42,000						
9	39,000	42,500						
10	40,000	43,500						
11		44,000						
12		45,000	50,000					
13		45,500	50,500					
14		46,500	51,500					
15		47,000	52,000					
16		48,000	52,500	58,000				
17		48,500	53,500	58,500				
18		49,500	54,000	59,000				
19		50,000	54,500	60,000				
20		51,000	55,500	60,500	66,000			
21		51,500	56,000	61,000	66,500			
22		52,500	56,500	61,500	67,000			

* Tandem Axle by Definition.
+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE: All permissible load calculations are to the nearest 500 lbs. Maximum load on any single axle, 20,000 lbs. Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Federal Bridge Formula Table (Continued)

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
23		53,000	57,500	62,500	68,000			
24		54,000	58,000	63,000	68,500	74,000		
25		54,500	58,500	63,500	69,000	74,500		
26		55,500	59,500	64,000	69,500	75,000		
27		56,000	60,000	65,000	70,000	75,500		
28		57,000	60,500	65,500	71,000	76,500	82,000	
29		57,500	61,500	66,000	71,500	77,000	82,500	
30		58,500	62,000	66,500	72,000	77,500	83,000	
31		59,000	62,500	67,500	72,500	78,000	83,500	90,000
32		60,000	63,500	68,000	73,000	78,500	84,500	90,500
33			64,000	68,500	74,000	79,000	85,000	91,000
34			64,500	69,000	74,500	80,000	85,500	91,500
35			65,500	70,000	75,000	80,500	86,000	92,000
36			66,000+	70,500	75,500	81,000	86,500	93,000
37			66,500+	71,000	76,000	81,500	87,000	93,500
38			67,500+	72,000	77,000	82,000	87,500	94,000
39			68,000	72,500	77,500	82,500	88,500	94,500
40			68,500	73,000	78,000	83,500	89,000	94,500
41			69,500	73,500	78,500	84,000	89,500	95,000
42			70,000	74,000	79,000	84,500	90,000	95,500

* Tandem Axle by Definition.
+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE: All permissible load calculations are to the nearest 500 lbs. Maximum load on any single axle, 20,000 lbs. Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

(Weight Distribution Concepts Section – continued on next page)

(Weight Distribution Concepts Section – continued from previous page)

Federal Bridge Formula Table (Continued)

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
43			70,500	75,000	80,000	85,000	90,500	96,000
44			71,500	75,500	80,500	85,500	91,000	96,500
45			72,000	76,000	81,000	86,000	91,500	97,500
46			72,500	76,500	81,500	87,000	92,500	98,000
47			73,500	77,500	82,000	87,500	93,000	98,500
48			74,000	78,000	83,000	88,000	93,500	99,000
49			74,500	78,500	83,500	88,500	94,000	99,500
50			75,500	79,000	84,000	89,000	94,500	100,000
51			76,000	80,000	84,500	89,500	95,000	100,500
52			76,500	80,500	85,000	90,500	95,500	101,000
53			77,500	81,000	86,000	91,000	96,500	102,000
54			78,000	81,500	86,500	91,500	97,000	102,500
55			78,500	82,500	87,000	92,000	97,500	103,000
56			79,500	83,000	87,500	92,500	98,000	103,500
57			80,000	83,500	88,000	93,000	98,500	104,000
58				84,000	89,000	94,000	99,000	104,500
59				85,000	89,500	94,500	99,500	105,000
60				85,500	90,000	95,000	100,500	105,500

* Tandem Axle by Definition.
+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE: All permissible load calculations are to the nearest 500 lbs. Maximum load on any single axle, 20,000 lbs. Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

COMMODITY AND MATERIAL WEIGHTS

Approximate Weights of Commodities and Materials

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Acetone		– – –	50	6.6 / gallon
Alcohol,	Commercial	– – –	51	6.8 / gallon
	Proof spirits	– – –	57	7.6 / gallon
Alfalfa seed		bushel	– –	60 / bushel
Aluminum,	Pure (cast)	– – –	165	4,450 / cu. yard
Apples,	Fresh	basket-bushel	– –	48 / bushel
	Western, box	11.5" x 12" x 20"	– –	50 / box
	New England, box	11.25" x 14.5" x 17.5"	– –	56 / box
	Standard barrel	17" head, 28.5" stave	– –	160 / barrel
	Dried	bushel	– –	24 / bushel
Apricots,	Fresh	bushel	– –	48 / bushel
	Western, box	5.5" x 12" x 20"	– –	23 / box
Artichokes,	Box	10" x 11.5" x 22"	– –	44 / box
Asbestos		– – –	153	4,130 / cu. yard
Asparagus, crate,	Loose	11.5" high x 9.75" top	– –	38 / crate
	Bunches	11" bottom x 19.38" long	– –	31 / crate
Avocados,	Box	5.75" x 11.25" x 17.5"	– –	16 / box
Bananas,	Single stem	bunch	– –	45-65 / bunch
Barley		bushel	– –	48 / bushel
Barytes,	Mineral	– – –	280	7,560 / cu. yard
Basalt,	Rock	– – –	185	5,000 / cu. yard
Beans, dry,	Lima	bushel	– –	56 / bushel
	White	bushel	– –	60 / bushel
	Castor	bushel	– –	46 / bushel
Beans, fresh,	Lima	bushel	– –	39 / bushel
	String	bushel	– –	36 / bushel
		hamper, 5 peck	– –	45 / hamper

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Beef,	Slack barrel	21" x 30" stave (200 lbs. net)	– –	254 / barrel
Beer,	Wood barrel	.5 barrel (16 gal.)	– –	205 / barrel
	Wood barrel	.25 barrel (8 gal.)	– –	105 / barrel
	Steel barrel	.5 barrel (16 gal.)	– –	190 / barrel
	Steel barrel	.25 barrel (8 gal.)	– –	95 / barrel
	Dutchman	.13 barrel (4 gal.)	– –	51 / barrel
Case carton,*	Regular bottles	17.25" x 11.5" x 9.88"	– –	45 / case
24, 12 oz.	Steinie bottles	18.38" x 12.13" x 7.38"	– –	40 / case
	Tin cans	16.13" x 11" x 5.13"	– –	28 / case
Wooden case,*	Regular bottles	21" x 13.5" x 10"	– –	35 / case
24, 12 oz.	Steinie bottles	22" x 13.75" x 7.5"	– –	46 / case
Beets		bushel	– –	50-60 / bushel
	Small crate	9.75" x 13.75" x 24"	– –	50 / crate
	Western crate	14" x 19" x 24.5"	– –	95 / crate
Berries, crate,	24 pint	9.75" x 9.97" x 20"	– –	25 / crate
	24 quart	11.75" x 11.75" x 24"	– –	48 / crate
	32 quart	15.5" x 11.75" x 24"	– –	63 / crate
Bluegrass seed		bushel	– –	44 / bushel
Bluestone		– – –	120	3,240 / cu. yard
Bone		– – –	115	3,110 / cu. yard
Borax		– – –	110	2,970 / cu. yard
Bran		bushel	– –	20 / bushel
Brick,	Soft	2.25" x 4" x 8.25"	– –	4,320 / thousand
	Common	2.25" x 4" x 8.25"	– –	5,400 / thousand
	Hard	2.25" x 4.25" x 8.5"	– –	6,480 / thousand
	Pressed	2.38" x 4" x 8.38"	– –	7,500 / thousand
	Paving	2.25" x 4" x 8.5"	– –	6,750 / thousand
	Paving block	3.5" x 4" x 8.5"	– –	8,750 / thousand
	Fire	2.5" x 4.5" x 9"	– –	7,000 / thousand

* **Note:** Beer cases vary as to size and shape. Suggest checking with local source.

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Broccoli,	Bushel crate	12.75" x 12.75" x 17"	– –	30 / bushel
Brussels sprouts,	Crate	7.75" x 10.5" x 21.38"	– –	26 / crate
Buckwheat		bushel	– –	49 / bushel
Butter, tub,	Small	15" dia. x 5.75"	– –	25 / tub
	Standard	15" dia. x 15"	– –	70 / tub
Butter, case,	30 – 1-lb. bricks	10.75" x 8.75" x 10.5"	– –	32 / case
	9-lb. pail	pail	– –	10 / pail
Cabbage		bushel	– –	38 / bushel
	Hamper	1.5 bushel	– –	58 / hamper
	Crate	12.75" x 18.5" x 19"	– –	60 / crate
	Western crate	14" x 19" x 24.5"	– –	85 / crate
	Barrel crate	12.75" x 18.75" x 37.38"	– –	110 / crate
Calf,	Live (average)	per head	– –	140-160 / head
Cantaloupe, crate,	Pony	11.75" x 11.75" x 23.5"	– –	58 / crate
	Standard	12.75" x 12.75" x 23.5"	– –	68 / crate
	Jumbo	13.75" x 13.75" x 23.5"	– –	78 / crate
	Pony flat	4.75" x 12.75" x 23.5"	– –	26 / crate
	Standard flat	5.25" x 14.25" x 23.5"	– –	28 / crate
	Jumbo flat	5.75" x 15.25" x 23.5"	– –	32 / crate
	Honeydew (Casaba)	6.38" x 15.13" x 23.5"	– –	35 / crate
Carbolic acid		– – –	60	8.0 / gallon
Carrots,	Topped	bushel	– –	55 / bushel
	With tops	bushel	– –	40 / bushel
	Crate	11.75" x 14.13" x 24"	– –	60 / crate
Castor oil		– – –	61	8.1 / gallon
Cauliflower		bushel	– –	30 / bushel
	Crate	9.38" x 19" x 24"	– –	50 / crate
Cedar*	(lumber)	– – –	30	2,500 / M. Bd. ft.
Celery,	Standard crate	11.63" x 22" x 22.63"	– –	70 / crate
	Half crate	10.75" x 13" x 20.38"	– –	35 / crate
	Northern crate	16.5" x 21.25" x 22"	– –	85 / crate

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Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Cement,	Block	8" x 8" x 16"	– –	42 / each
	Block	8" x 12" x 16"	– –	58 / each
	Portland	sack	– –	94 / sack
	Portland	barrel (4 sacks per)	– –	376 / barrel
Chalk		– – –	137	3,700 / cu. yard
Charcoal,	Oak	– – –	33	890 / cu. yard
	Pine	– – –	23	620 / cu. yard
Cheese,	Small box	15" dia. x 5.25"	– –	25 / box
	Medium box	15" dia. x 7.5"	– –	35 / box
	Large box	15" dia. x 15"	– –	70 / box
Cherries,	Unstemmed	bushel	– –	56 / bushel
	Stemmed	bushel	– –	64 / bushel
	Lug box	5.63" x 11.88" x 19.75"	– –	17 / box
Chestnut*	(lumber)	– – –	37	3,080 / M. Bd. ft.
Chestnuts		bushel	– –	50 / bushel
Chickens,	Live, broilers (20 avg.)	standard crate	– –	58 / crate
	Fowl (12 avg.)	standard crate	– –	78 / crate
	Standard crate, empty	24" x 35" x 13"	– –	18 / crate
Cinder blocks		8" x 8" x 16"	– –	35 / each
		8" x 12" x 16"	– –	45 / each
Cinders		– – –	50	1,350 / cu. yard
Clay,	Dry lumps	– – –	85	2,300 / cu. yard
	Wet lumps	– – –	110	2,970 / cu. yard
	Wet packed	– – –	135	3,650 / cu. yard
	Fire	– – –	125	3,375 / cu. yard
Cork		– – –	15	405 / cu. yard
Corn,	Ear	bushel	– –	35 / bushel
	Shelled	bushel	– –	56 / bushel
	Sweet corn (green)	bushel	– –	43 / bushel
	Crate	12.88" x 12.88" x 24"	– –	60 / crate
Corn meal		bushel	– –	44 / bushel

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Corn oil		– – –	58	7.8 / gallon
Corn syrup		– – –	86	11.5 / gallon
Cotton,	Gin bale	30" x 48" x 54"	– –	515 / bale
	Standard bale	24" x 28" x 56"	– –	515 / bale
	Comp. bale	20" x 24" x 56"	– –	515 / bale
Cotton seed		bushel	– –	32 / bushel
Cottonseed oil		– – –	58	7.8 / gallon
Cottonwood*	(lumber)	– – –	37	3,080 / M. Bd. ft.
Cow,	Live-Feeder (average)	per head	– –	600 / head
	Butcher (average)	per head	– –	800 / head
	Butcher steer (average)	per head	– –	1100 / head
Cranberries,	1/4 barrel box	9.5" x 11" x 14"	– –	28 / box
	1/2 barrel box	12.25" x 14.75" x 22"	– –	60 / box
Cream		– – –	64	8.5 / gallon
Creosote		– – –	68	9.2 / gallon
Crude oil		– – –	56	7.5 / gallon
Cucumbers		bushel	– –	55 / bushel
	Crate	9.75" x 13.75" x 24"	– –	75 / crate
	Case	5" x 13.25" x 19"	– –	26 / case
Earth,	Loose, dry loam	– – –	76	2,050 / cu. yard
	Packed	– – –	95	2,565 / cu. yard
	Wet	– – –	125	3,375 / cu. yard
Eggplant,	Hamper	bushel	– –	40 / bushel
	Crate	14" x 11.75" x 24"	– –	54 / crate
Eggs,	30 dozen crate	12" x 12" x 26"	– –	55 / crate
Elm,*	Soft	– – –	38	3,170 / M. Bd. ft.
	Rock	– – –	45	3,750 / M. Bd. ft.
Fertilizer,	Commercial	burlap bag	– –	100-200 / bag
Fir,*	Douglas	– – –	32	2,670 / M. Bd. ft.
	Eastern	– – –	25	2,080 / M. Bd. ft.

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Fish, fresh,	Barrel	19" head, 29" stave	– –	300 / barrel
	1/2 Barrel	18.5" head, 23.5" stave	– –	160 / 1/2 barrel
Flour,	Barrel	19.13" head, 30" stave	– –	215 / barrel
Fuel oil,	Furnace grade	– – –	56	7.5 / gallon
	Diesel engine	– – –	52	7.0 / gallon
Furniture,	Household	– – –	7	1,915 / cu. yard
Garbage,	Dry, paper wrapped	– – –	15-30	405-810 / cu. yard
	Wet	– – –	50	1,240 / cu. yard
Gasoline		– – –	45	6.0 / gallon
Glass,	Common window	– – –	– –	162 / cu. foot
	Plate or crown	– – –	– –	161 / cu. foot
	1/4" plate	– – –	– –	3.3 / sq. foot
Glue		– – –	80	2,160 / cu. yard
Glycerine		– – –	79	10.5 / gallon
Grapefruit,	Western box	11.5" x 11.5" x 24"	– –	68 / box
	Southern box	12.75" x 12.75" x 27"	– –	90 / box
Grapes,	Basket	bushel	– –	48 / box
	Lug box	5.63" x 16.38" x 17.5"	– –	30 / box
	Western keg	15.5" dia. x 14"	– –	45 / keg
	Basket	12 quart	– –	18 / basket
Gravel,	Dry	– – –	95	2,565 / cu. yard
	Wet	– – –	125	3,375 / cu. yard
Greens		bushel	– –	25 / bushel
Groceries,	Misc. assorted	– – –	30	810 / cu. yard
Hay,	Bale	26" x 30" x 46"	– –	210 / bale
	Bale	17" x 22" x 43"	– –	115 / bale
	Bale	14" x 16" x 43"	– –	85 / bale
Hog,	Live (average)	per head	– –	225-250 / head
Honey		– – –	90	12.0 / gallon
Horse,	Live (average)	per head	– –	1,200-1,500 / head

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Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Horseradish roots		bushel	– –	35 / bushel
Ice		– – –	57	1,540 / cu. yard
Ice (mfg.),	Block	11" x 22" x 32"	– –	250 / block
	Block	14" x 14" x 40"	– –	255 / block
	Block	11" x 22" x 56"	– –	440 / block
Ice Cream,	2.5 gallon can, Full	9" dia. x 11"	– –	18 / can
	Empty	– – –	– –	6 / can
	5 gallon can, Full	9" dia. x 21"	– –	35 / can
	Empty	– – –	– –	11 / can
Kale		bushel	– –	25 / bushel
Kerosene		– – –	50	6.6 / gallon
Lamb,	Live (average)	per head	– –	75-85 / head
Lard,	Barrel	18" head, 30" stave	– –	425 / barrel
Lath,	Standard length 29"	Packed in bundles of 50 Average bundle, dia. 9"	– –	25 / bundle
Leather,	Dry	– – –	55	1,485 / cu. yard
	Wet	– – –	65	1,755 / cu. yard
Lemons,	Western box	10" x 13" x 25"	– –	80 / box
	Southern box	12.75" x 12.75" x 27"	– –	90 / box
Lentils		bushel	– –	60 / bushel
Lettuce,	Hamper	bushel	– –	25 / bushel
	Hamper	1.5 bushel	– –	38 / hamper
	Basket	8.5" x 11.75" x 21.38"	– –	17 / basket
	Crate	18.75" x 17.5" x 24.5"	– –	75 / crate
	1/2 crate	9.5" x 13.5" x 24.5"	– –	40 / 1/2 crate
Lime,	Hydrated	bushel	– –	30 / bushel
	Barrel (small)	16.5" head, 27.5" stave	62	210 / barrel
	Barrel (large)		62	320 / barrel
Limes,	Western box	10" x 13" x 25"	– –	80 / box
	Southern box	12.75" x 12.75" x 27"	– –	90 / box
Linseed oil		– – –	59	7.9 / gallon
Lubricating oil		– – –	52	7.0 / gallon
Malt,	Barley	bushel	– –	28 / bushel
	Rye	bushel	– –	32 / bushel
	Brewer's grain	bushel	– –	40 / bushel
Maple syrup		gallon	82	11.0 / gallon
Maple,*	Hard (lumber)	– – –	44	3,670 / M. Bd. ft.
	Soft	– – –	34	2,830 / M. Bd. ft.
Meal-corn		bushel	– –	44 / bushel
Milk,	Bulk	– – –	64	8.6 / gallon
	5 gallon can	10.25" dia. x 19"	– –	62 / can
	10 gallon can	13" dia. x 23"	– –	115 / can
	Crate, 20.5 pt. bottles	8.5" x 12.75" x 16.75"	– –	33 / crate
	20 pt. bottles	8.5" x 12.75" x 16.75"	– –	54 / crate
Millet		bushel	– –	50 / bushel
Molasses		– – –	90	12.0 / gallon
	Barrel	20.25" head, 34" stave	– –	675 / barrel
Mortar,	Lime	– – –	110	2,970 / cu. yard
Mud,	Flowing	– – –	106	2,860 / cu. yard
	Packed	– – –	125	3,375 / cu. yard
Muriatic acid,	40%	– – –	40	10.0 / gallon
Naptha,	Petroleum	– – –	42	5.6 / gallon
Nitric acid,	91%	– – –	94	12.5 / gallon
Oak-red,*	Black	– – –	42	3,500 / M. Bd. ft.
	White	– – –	48	4,080 / M. Bd. ft.
Oats		bushel	– –	32 / bushel
Okra,	Hamper	1/2 bushel	– –	18 / hamper
	Hamper	bushel	– –	34 / bushel
Oleomargarine,	(mfg.-tub)	21" head, 34" stave	– –	70 / tub
	Cases	– – –	– –	15-65 / case

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Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Olive oil		– – –	58	7.7 / gallon
Onions, dry,	Basket	bushel	– –	55 / bushel
	Bag	17" x 32"	– –	50 / bag
	Crate	20.5" x 11.5" x 10.5"	– –	58 / crate
	Green (with tops)	bushel	– –	32 / bushel
Oranges,	Western box	11.5" x 11.5" x 24"	– –	80 / box
	Southern box	12.75" x 12.75" x 27"	– –	90 / box
	Bushel box	10.75" x 10.75" x 23.5"	– –	65 / box
Oysters (shucked or meats)				
	Crate with 5.1 gal. cans	18" x 12" x 24"	(11.5 lbs. per gal.)	67 / crate
	With shells (bags)	bushel	– –	75 / bushel
Paint,	Lead and oil	– – –	127	17 / gallon
Paper,	Average solid	– – –	58	1,565 / cu. yard
	Newspaper rolls	34.25" x 35" dia.	– –	500 / roll
		51.5" x 35" dia.	– –	1,000 / roll
		64.25" x 35" dia.	– –	1,300 / roll
Paraffin		– – –	56	1,510 / cu. yard
Parsley,	Bushel crate	12.75" x 12.75" x 17"	– –	30 / crate
Parsnips		bushel	– –	50 / bushel
Peaches,	Basket	bushel	– –	48 / bushel
	1/2 bushel	– – –	– –	25 / basket
	Crate	10.5" x 11.25" x 24"	– –	50 / crate
	Western box	5.5" x 12.25" x 19.75"	– –	22 / box
Peanuts,	Unshelled	bushel	– –	22 / bushel
	Bag	– – –	– –	100 / bag
Peanut oil		– – –	57	7.6 / gallon
Pears,	Basket	bushel	– –	50 / bushel
	Western box	9.63" x 12.13" x 19.75"	– –	51 / box
Peas,	Dry	bushel	– –	60 / bushel
	Fresh hamper	bushel	– –	35 / hamper
	Hamper	40 quarts	– –	45 / hamper

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Pecans,	Large bag	– – –	– –	100 / bag
	Small bag	– – –	– –	50 / bag
Peppers,	Basket	bushel	– –	25 / basket
	Crate	14.13" x 11.75" x 24"	– –	45 / crate
Petroleum		– – –	56	7.5 / gallon
Phosphate rock		– – –	200	5,400 / cu. yard
Pine,*	Long leaf	– – –	44	3,670 / M. Bd. ft.
	North Carolina	– – –	36	3,000 / M. Bd. ft.
	Oregon	– – –	32	2,670 / M. Bd. ft.
	Red	– – –	30	2,500 / M. Bd. ft.
	White	– – –	26	2,170 / M. Bd. ft.
	Yellow, long leaf	– – –	44	3,670 / M. Bd. ft.
	Short leaf	– – –	38	3,170 / M. Bd. ft.
Pineapples,	Crate	11" x 12.5" x 36"	– –	85 / crate
Pitch		– – –	70	1,900 / cu. yard
Plums,	Basket	bushel	– –	56 / bushel
	Western box	5.63" x 16.38" x 17.5"	– –	25 / box
Pomegranates,	Box	6.5" x 12" x 24.63"	– –	30 / box
Popcorn,	Ear	bushel	– –	70 / bushel
	Shelled	bushel	– –	56 / bushel
Poplar*		– – –	27	2,250 / M. Bd. ft.
Porcelain		– – –	150	4,050 / cu. yard
Pork (dressed),	Barrel (200 lbs. net)	18" head, 29" stave	– –	240 / barrel
Potatoes,	Sweet	bushel	– –	55 / bushel
	White or Irish	bushel	– –	60 / bushel
	Bag	1.67 bushel	– –	102 / bag
	Barrel	17.13" head, 28.5" stave	– –	185 / barrel
Prunes,	Box	5.63" x 16.38" x 19.75"	– –	25 / box
	Box	5.63" x 11.88" x 19.75"	– –	22 / box
Quinces		bushel	– –	50 / bushel

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Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Radishes,	Basket	bushel	– –	34 / bushel
	Crate	9.75" x 13.75" x 24"	– –	40 / crate
Redwood*		– – –	30	2,500 / M. Bd. ft.
Resin		– – –	68	1,835 / cu. yard
Rhubarb (pie plant)		bushel	– –	50 / bushel
	Box	5.25" x 11.5" x 22"	– –	24 / box
Rice,	Unhulled	bushel	– –	43 / bushel
Rock,	Crushed (average)	– – –	100	2,700 / cu. yard
Romaine,	Crate	13.88" x 18.88" x 24.5"	– –	64 / crate
	Crate	12.25" x 13" x 15.25"	– –	27 / crate
Rubber goods		– – –	94	2,540 / cu. yard
Rutabagas		bushel	– –	56 / bushel
Rye		bushel	– –	56 / bushel
Salt, rock,	Solid	– – –	136	3,670 / cu. yard
	Coarse	– – –	45	1,215 / cu. yard
	Fine	– – –	50	1,350 / cu. yard
	Barrel (average)	– – –	– –	280 / barrel
Sand, fine,	Dry	– – –	110	2,970 / cu. yard
	Wet	– – –	125	3,375 / cu. yard
Sand, coarse,	Dry	– – –	95	2,565 / cu. yard
	Wet	– – –	120	3,240 / cu. yard
Sand,	Mixed	– – –	115	3,100 / cu. yard
Sandstone,	Solid	– – –	147	3,970 / cu. yard
	Crushed	– – –	86	2,325 / cu. yard
Shale,	Solid	– – –	172	4,645 / cu. yard
	Crushed	– – –	92	2,485 / cu. yard
Sheep,	Live (average)	per head	– –	125-150 / head
Shingles,	Bundle	Pkg. in bndls. of 200-250 Size (avg.) 24" x 20" x 10"	– –	50 / bundle
Snow,	Moist-packed	– – –	50	1,350 / cu. yard

*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Soft drinks,	Half depth bottle box			
	24-6 to 8 oz. bottles	12.25" x 18.75" x 8.5"	– –	39 / box
	Full depth bottle box			
	12-24 to 32 oz. bottles	13.38" x 18.5" x 12.25"	– –	60 / box
Sorghum syrup		– – –	86	11.5 / gallon
Soybeans		bushel	– –	60 / bushel
Soybean oil		– – –	58	7.7 / gallon
Spinach,	Hamper	bushel	– –	20 / bushel
	Basket	bushel	– –	27 / bushel
Spruce*		– – –	28	2,330 / M. Bd. ft.
Squash		bushel	– –	46 / bushel
Starch		– – –	96	2,590 / cu. yard
Stone,	Crushed, (average)	– – –	100	2,700 / cu. yard
	Rip-rap	– – –	65	1,755 / cu. yard
Straw,	Bale	17" x 22" x 42"	– –	110 / bale
	Bale	26" x 30" x 46"	– –	180 / bale
Street sweepings		– – –	32	865 / cu. yard
Sugar		– – –	100	2,700 / cu. yard
Sugar,	Bag	(100 lbs. net)	– –	101 / bag
	Barrel (22 lbs. empty)	19.13" head, 30" stave	– –	345 / barrel
	Case	24 – 5-lb. cartons	– –	135 / case
	Case	60 – 2-lb. cartons	– –	135 / case
Sugar cane syrup		– – –	85	11.3 / gallon
Sulphur		– – –	125	3,375 / cu. yard
Sulfuric acid,	87%	– – –	112	15 / gallon
Sweet corn,	Basket	bushel	– –	45 / bushel
	Crate	13" x 13" x 24"	– –	60 / crate
Sycamore*		– – –	37	3,080 / M. Bd. ft.
Tallow		– – –	60	1,620 / cu. yard

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Tanks, Acetylene,	102 cu. foot	empty	– –	70 / tank
		filled	– –	75 / tank
	310 cu. foot	empty	– –	200 / tank
		filled	– –	220 / tank
Tanks, Oxygen,	150 cu. foot	empty	– –	80 / tank
		filled	– –	92 / tank
	300 cu. foot	empty	– –	133 / tank
		filled	– –	153 / tank
Tar		– – –	65	1755 / cu. yard
Tile,	Solid	– – –	115	3,100 / cu. yard
	Partition (construction)	– – –	40	1,080 / cu. yard
Tomatoes,	Basket	bushel	– –	55 / bushel
	Lug box	7.25" x 14" x 17.5"	– –	35 / box
	Crate	10.5" x 11.25" x 24"	– –	48 / crate
	Basket	8.5" x 8.75" x 20"	– –	18 / basket
	Basket (paper)	4.25" x 8.5" x 16.25"	– –	9 / basket
	Basket (wood)	5.5" x 7.25" x 16.5"	– –	10 / basket
Turpentine		– – –	54	7.2 / gallon
Turnips,	Basket	bushel	– –	54 / bushel
Vetch seed		bushel	– –	60 / bushel
Vinegar		– – –	64	8.5 / gallon
Walnuts,	Bulk	bushel	– –	50 / bushel
	Bag	2 bushel	– –	100 / bag
Water,	Fresh	– – –	63	8.4 / gallon
Wheat,	Bulk	bushel	– –	60 / bushel
	Bag	1.5 bushel	– –	90 / bag
Wool,	Pressed	– – –	82	2,215 / cu. yard

*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

VEHICLE SPECIFICATIONS INDEX

NPR/W3500, NPR HD/W4500 GAS

Specifications

Model	NPR/W3500 Gas	NPR HD/W4500 Gas
GVWR	12,000 lbs.	14,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.	
Engine	GMPT 8-cylinder, V Block 4-cycle, OHV, water-cooled, Sequential Port Fuel Injection	
Model/Displacement	GMPT-V8/365 CID (6.0 liters)	
HP (Gross)	325 HP @ 5,000 RPM	
Torque (Gross)	360 lbs.-ft. torque @ 4,400 RPM	
Equipment	Sequential Port Fuel Injection (SFI), mass air flow meter, powertrain control module (PCM), onboard diagnostics, oxygen sensors, catalytic convertor, map sensor, with external oil cooler, engine cruise control, rear engine cover.	
Transmission	4L80-E Hydra-Matic 4-speed automatic w/lock-up converter and overdrive	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot "I"-Beam rated at 6,830 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	4,700 lbs.	5,360 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 11,020 lbs.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	7,950 lbs.	9,880 lbs.
Wheels	16 x 6.0 6-hole disc wheels, painted white.	19.5 x 6.0 6-hole disc wheels, painted white.
Tires	215/85R 16-E (10 pr) tubeless steel-belted radials, all-season tread front and rear.	225/70R-19.5F (12 ply) tubeless steel-belted radials, all-season tread front and rear.
Brakes	Dual-circuit, vacuum-assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system. Disc front and self-adjusting outboard mounted drum rear. The parking brake is a mechanical, cable-actuated, internal expanding drum type, transmission mounted. Four-channel antilock brake system.	
Fuel Tank	30-gallon rectangular steel fuel tank. Mounted between the frame rails with electric type fuel pump (mounted in tank). Through the rail fuel fill.	

NOTE: These selected specifications are subject to change without notice.

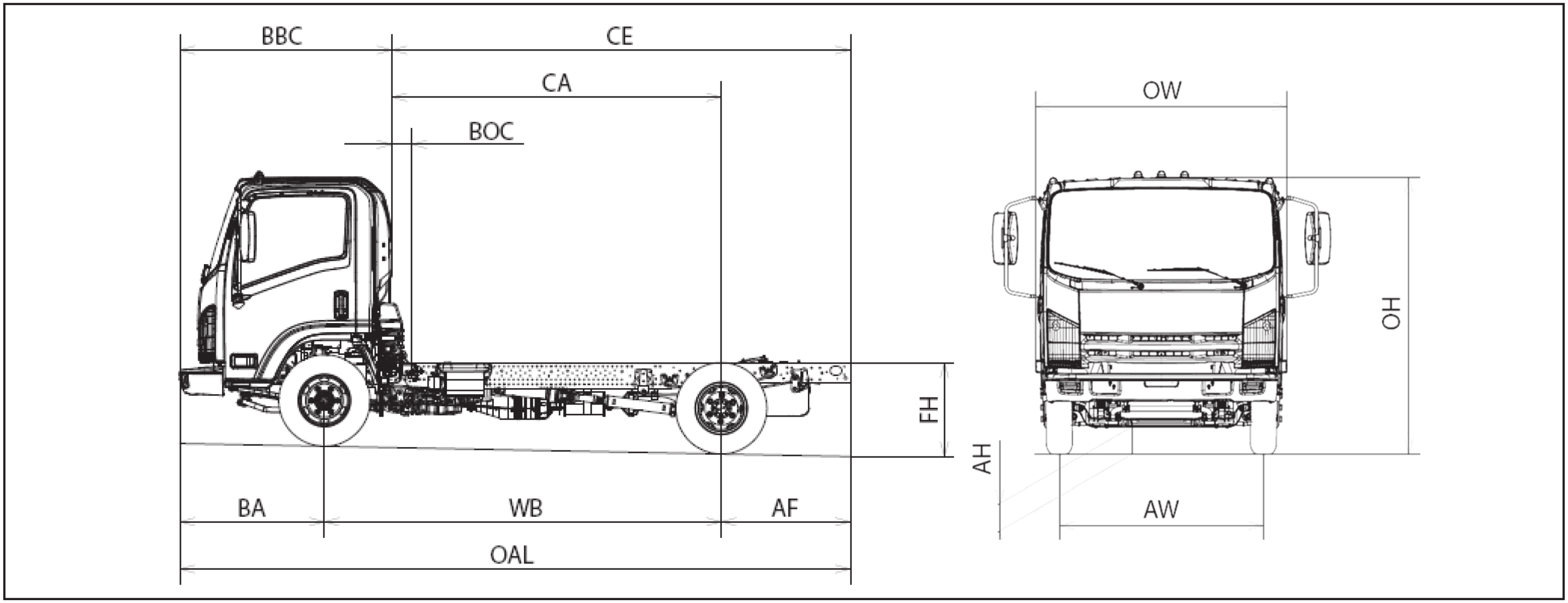
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Model	NPR/W3500 Gas	NPR HD/W4500 Gas
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in.^{3}, RBM 316,800 lbs.-ft./in. per rail.	
Cab	All-steel, low cab forward, BBC 70.9 in., 45º mechanical tilt with torsion assist.	
Equipment	Tricot breathable cloth covered high back driver's seat with two-occupant passenger seat. Dual cab-mounted exterior mirrors. With integral convex mirrors.Tilt and telescoping steering column. Tinted glass, air conditioning.	
Electrical	12-volt, negative ground, maintenance-free battery located on frame, 750 CCA each, 145-amp alternator with integral regulator.	
Options	AM/FM cassette stereo radio; spare wheel; Heated mirrors. Power windows and door locks, wheel simulators and air deflector.	

NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings



(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Variable Chassis Dimensions					
Unit	**WB**	**CA***	**CE***	**OAL**	**AF**
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

* Effective CA & CE are CA or CE less BOC.

Dimension Constants: 12,000 GVW					
Code	**Inches**	**Code**	**Inches**	**Code**	**Inches**
AH	8.6	BW	83.3	FH	31.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	90.0		
BOC	6.5	OW	81.4		

12,000-lb. GVWR with 4L80-E Hydra-Matic Transmission, Federal Emission Certificate and California MD ULEV Emission Certificate						
Model	**WB**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
DB1	109.0 in.	lb.	3,119	1,819	4,938	7,062
DB2	132.5 in.	lb.	3,164	1,841	5,005	6,995
DB3	150.0 in.	lb.	3,186	1,863	5,049	6,951
DB4	176.0 in.	lb.	3,230	1,885	5,115	6,885

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Dimension Constants: 14,500 GVW					
Code	**Inches**	**Code**	**Inches**	**Code**	**Inches**
AH	8.3	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	91.1		
BOC	6.5	OW	81.4		

14,500-lb. GVWR with 4L30-E Hydra-Matic Transmission, Federal Emission Certificate and California HD Emission Certificate.

Model	WB	Unit	Front	Rear	Total	Payload
FE1	109.0 in.	lb.	3,219	1,984	5,203	9,297
FE2	132.0 in.	lb.	3,263	2,006	5,269	9,231
FE3	150.0 in.	lb.	3,285	2,028	5,313	9,187
FE4	176.0 in.	lb.	3,329	2,050	5,379	9,121

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Vehicle Weight Limits:

GVWR		
Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	4,700 lbs.	5,360 lbs.
GAWR, Rear	7,950 lbs.	9,880 lbs.

Technical Notes:

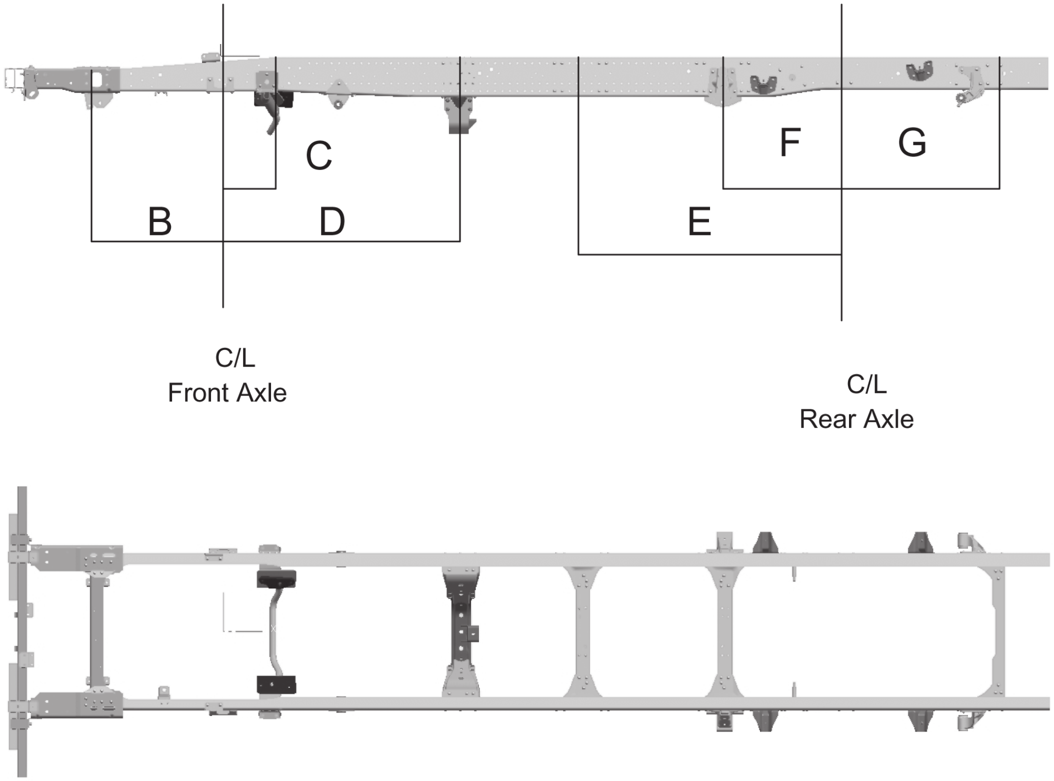
Chassis Curb Weight reflects standard equipment and fuel but no driver or payload.

Maximum Payload Weight is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Frame and Crossmember Specifications



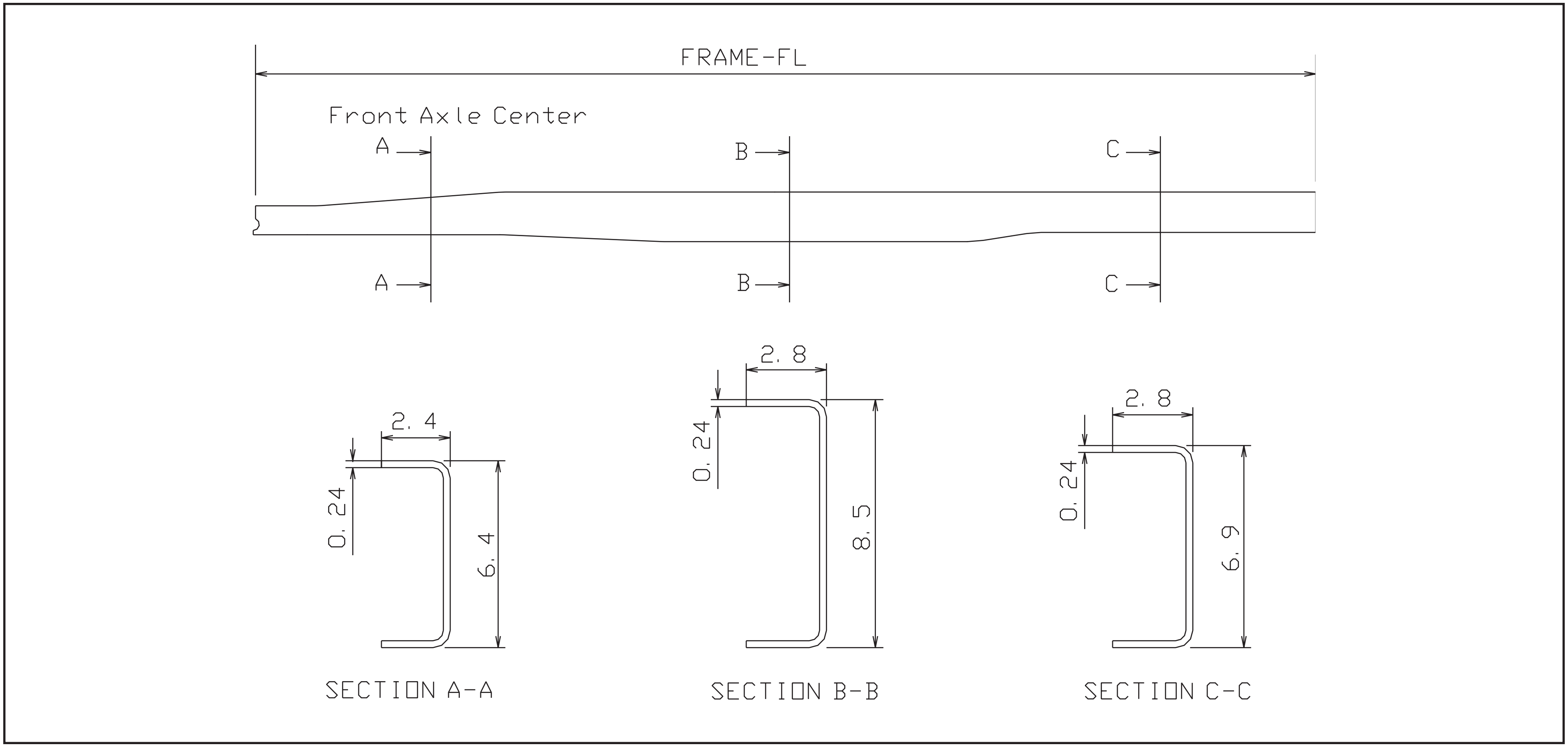
Wheelbase	Frame Thick	Crossmember Type/Location						
			B	C	D	E	F	G
109.0	0.24		28.3	7.9	AA 46.5	–	CC 24.2	DD 33.8
132.5	0.24		28.3	7.9	AA 46.5	BB 57.5	CC 24.2	DD 33.8
150.0	0.24		28.3	7.9	AA 46.5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24		28.3	7.9	AA 46.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Frame Chart

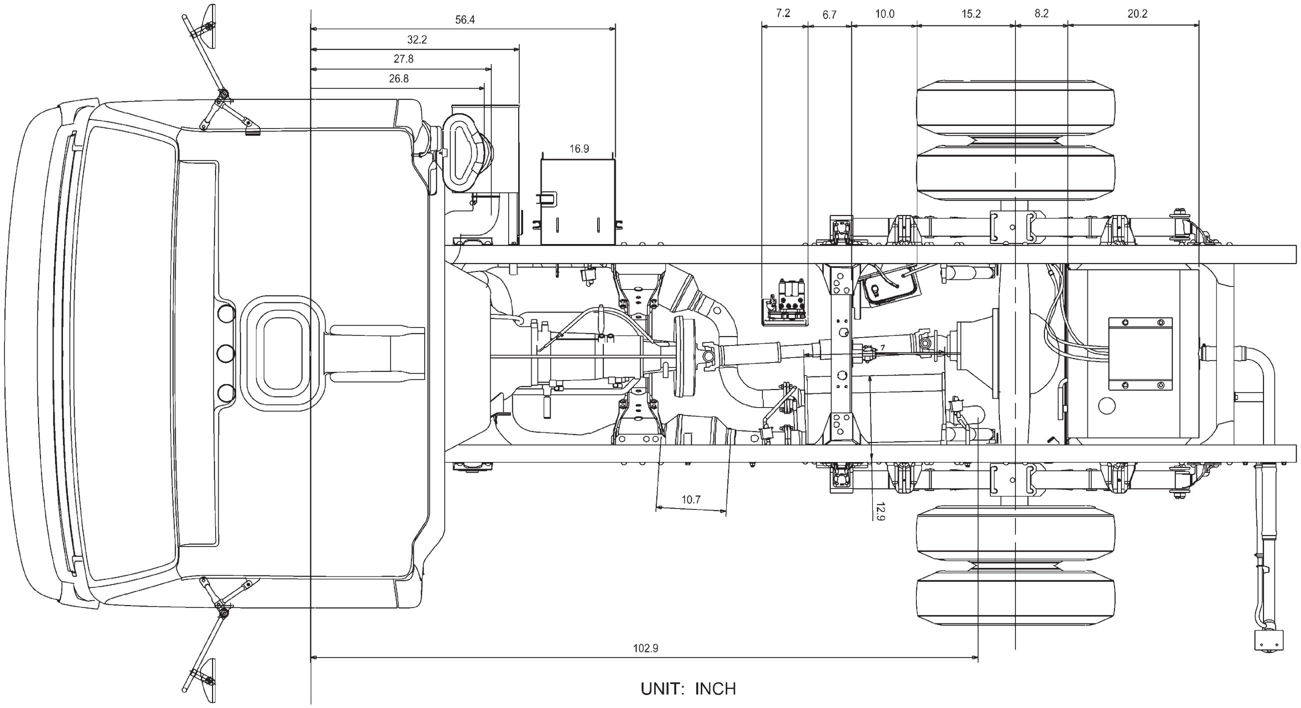

FRAME-FL
Front Axle Center
A
B
C
A
B
C
2.4
0.24
6.4
SECTION A-A
2.8
0.24
8.5
SECTION B-B
2.8
0.24
6.9
SECTION C-C

Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

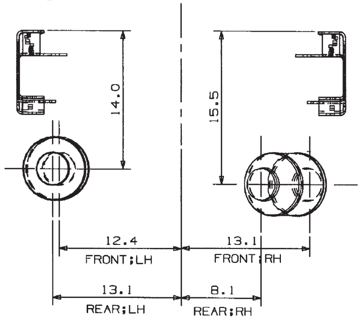
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Auxiliary Views

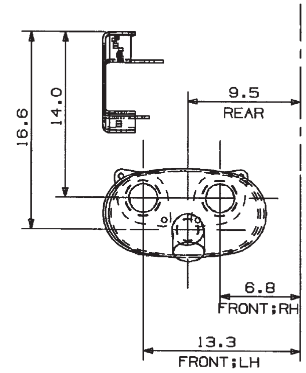

56.4
32.2
27.8
26.8
16.9
7.2
6.7
10.0
15.2
8.2
20.2
7
10.7
12.9
102.9
UNIT: INCH

①


14.0
15.5
12.4
FRONT;LH
13.1
FRONT;RH
13.1
REAR;LH
8.1
REAR;RH

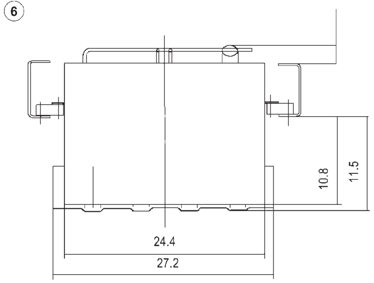
Rear View
Catalitic Converters

②


16.6
14.0
9.5
REAR
6.8
FRONT;RH
13.3
FRONT;LH

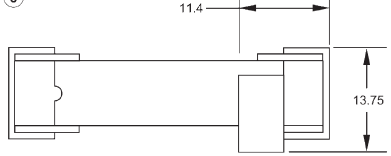
Rear View
Muffler

⑥


10.8
11.5
24.4
27.2

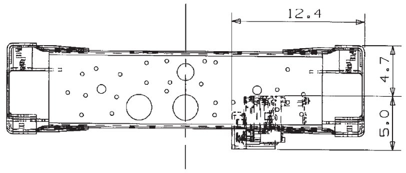
Side View
In Frame Tank

⑤



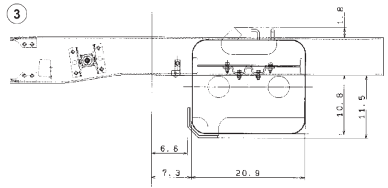
Rear View
Emission Canister

④



Rear View
ABS Controller

③


1.8
10.8
11.5
6.6
7.3
20.9

Side Veiw
In Frame Tank

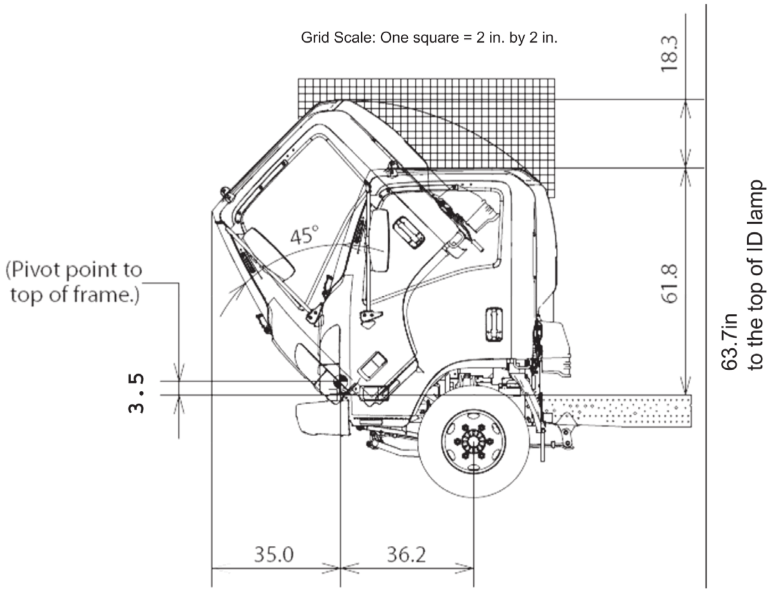
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Body Builder Weight Information Chart

GVWR	Axle	Wheelbase				Unsprung Weight
		109 in.	132.5 in.	150 in.	176 in.	
		Auto. Trans.	Auto. Trans.	Auto. Trans.	Auto. Trans.	
12,000	Front	3,119	3,164	3,186	3,230	573
	Rear	1,819	1,841	1,863	1,885	871
	Total	4,938	4,961	5,049	5,115	1,444
14,500	Front	3,219	3,263	3,285	3,329	705
	Rear	1,984	2,006	2,028	2,050	1,135
	Total	5,203	5,269	5,313	5,379	1,840

Cab Tilt


Grid Scale: One square = 2 in. by 2 in.
18.3
45°
(Pivot point to top of frame.)
61.8
63.7in to the top of ID lamp
3.5
35.0
36.2

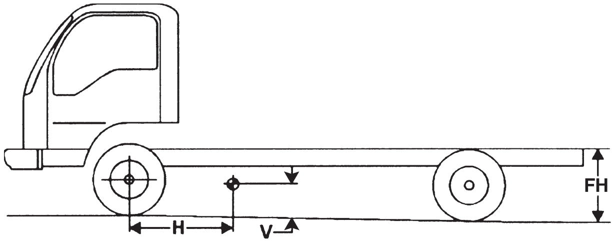
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H Auto. Trans.
12,000	109	21.7	38.8
	132.5	20.1	47.1
	150	19.7	53.5
	176	18.1	62.8
14,500	109	21.7	40.0
	132.5	20.0	48.6
	150	19.7	55.2
	176	18.1	64.7



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

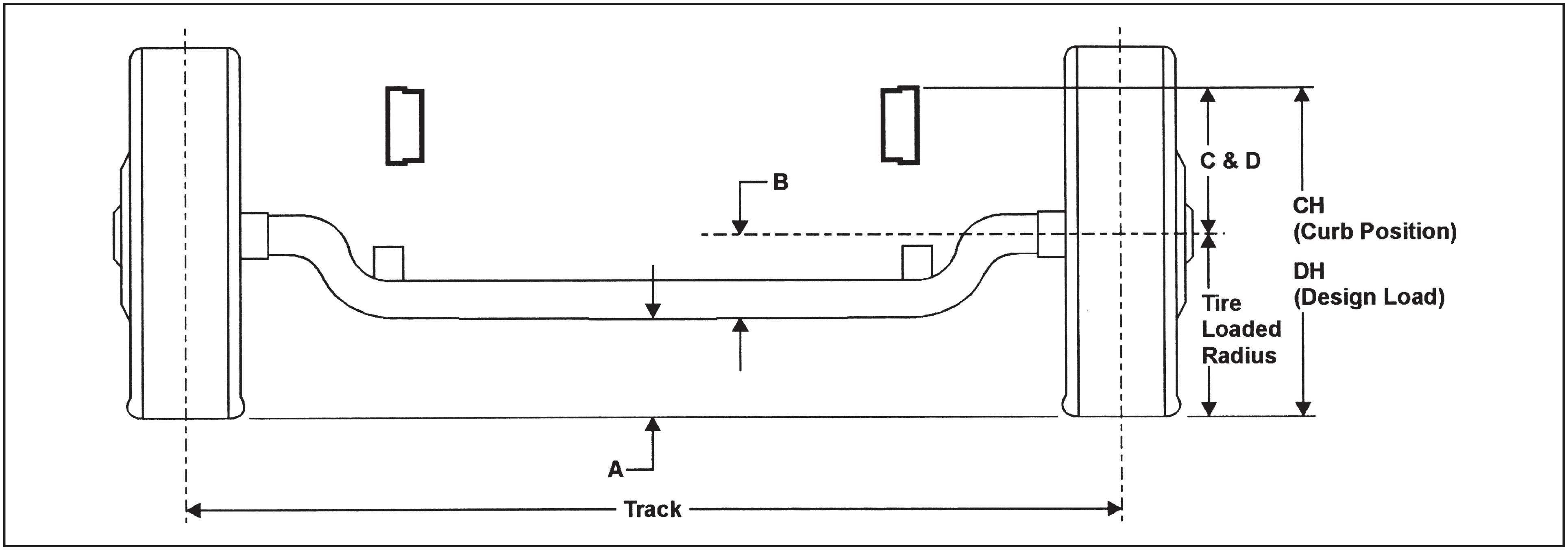
The center of gravity of the completed vehicle with a full load should not exceed 54 inches above ground level for the 12,000 lb. GVWR, 58 inches above ground level for the 14,500 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NPR/W3500, NPR HD/W4500 are 96 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by GM/Isuzu Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-678-240-9818.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Front Axle Chart



Formulas for calculating height dimensions:

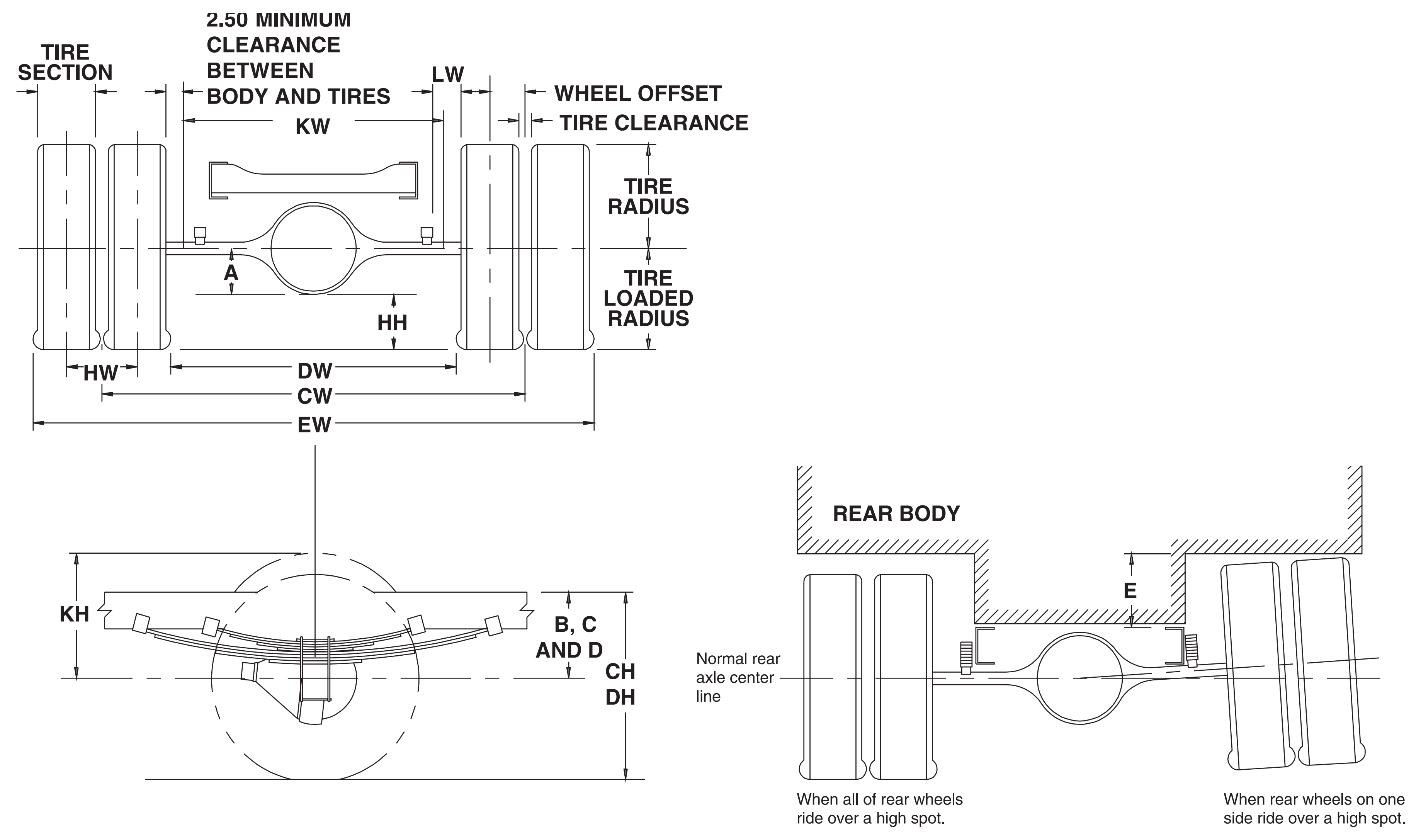
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	4,700 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1
225/70R 19.5	14,500 lbs.	6,830 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Rear Axle Chart


2.50 MINIMUM
CLEARANCE
BETWEEN
BODY AND TIRES
TIRE
SECTION
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE
RADIUS
A
TIRE
LOADED
RADIUS
HH
HW
DW
CW
EW
KH
B, C
AND D
CH
DH
REAR BODY
E
Normal rear
axle center
line
When all of rear wheels
ride over a high spot.
When rear wheels on one
side ride over a high spot.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DW	Minimum distance between the inner surfaces of the rear tires.
B	Centerline of axle to top of frame rail at metal-to-metal position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
C	Centerline of axle to top of frame rail at curb position.		
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the tires in a set of dual tires.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	KH	Tire Bounce Clearance: Minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

NOTE: Track and overall width may vary with optional equipment.

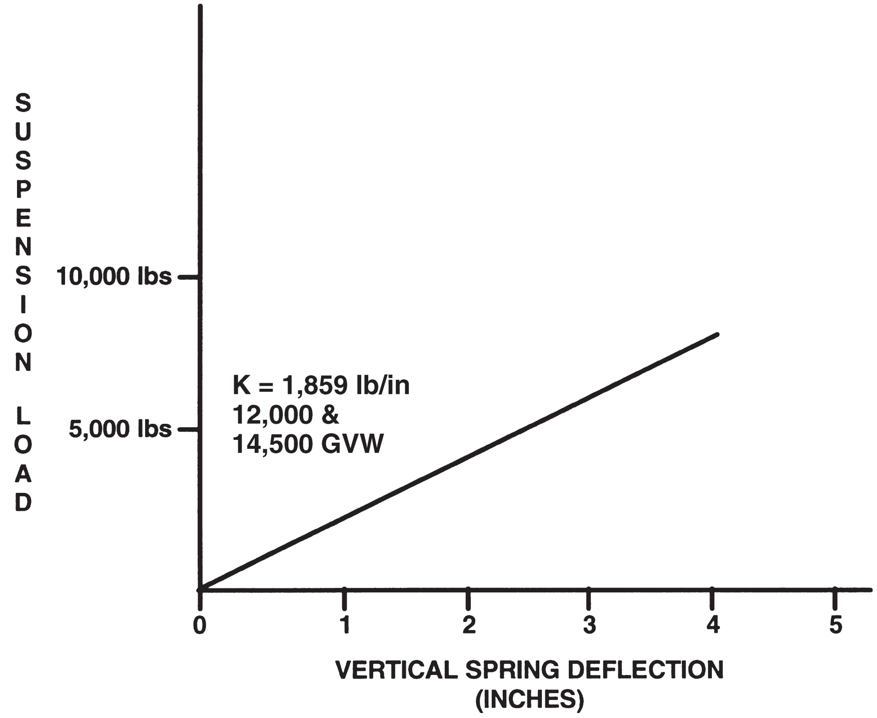
Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	7,950 lbs.	65.0	6.5 (A/T)	9.3 (A/T)	15.4	13.3/13.0	7.8
225/70R 19.5-F	9,880 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.6	13.4	8.4

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

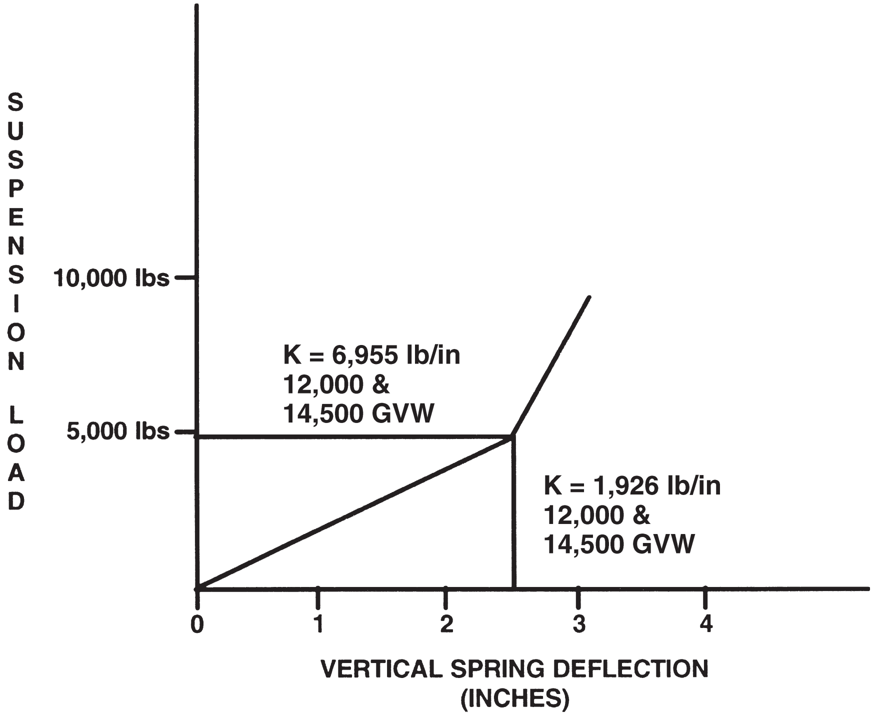
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Suspension Deflection Charts – NPR/W3500 Gas, NPR HD/W4500 Gas

Front Leaf Spring Load vs. Deflection (Per Axle)



Rear Leaf Spring Load vs. Deflection (Per Axle)



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(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Tire and Disc Wheel Chart – NPR/W3500

Tire

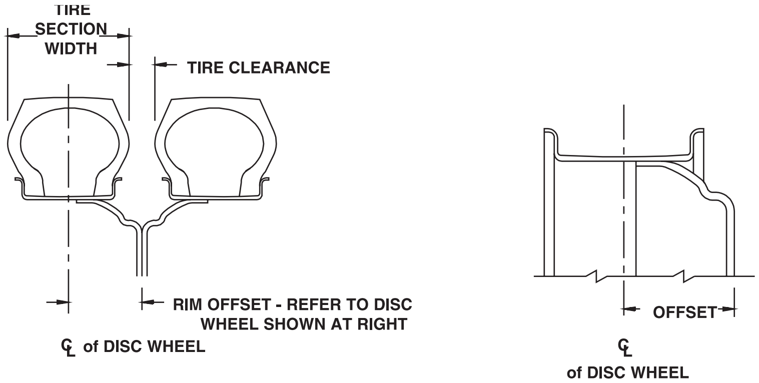
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16-E	2,430	70	2,210	70	4,860	8,840	12,000

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16-E	12,000	14.05	14.05	14.6	14.6	8.54	1.46	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	5º DC	Steel TOPY

* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Tire and Disc Wheel Chart – NPR HD/W4500

Tire

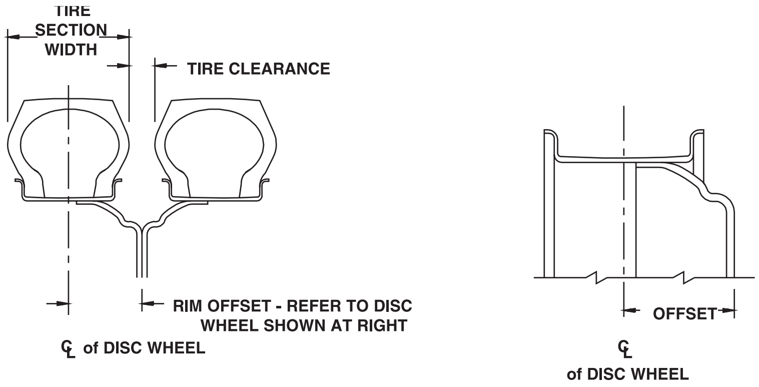
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5-F	3,315	85	3,115	85	6,630	12,460	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5-F	14,500	15.24	15.28	16.10	16.10	8.9	1.1	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 RW	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.37	15º DC	Steel ACCURIDE

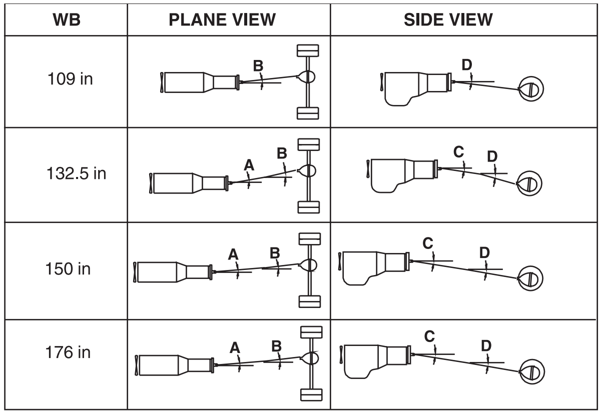
* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

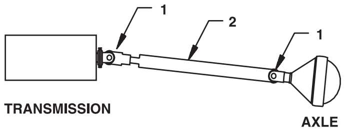
Propeller Shaft


WB
PLANE VIEW
SIDE VIEW
109 in
B
D
132.5 in
A
B
C
D
150 in
A
B
C
D
176 in
A
B
C
D

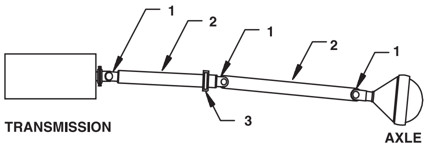
TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

NPR EFI

(109 in WB)


1
2
1
TRANSMISSION
AXLE

(132.5 in, 150 in and 176 in WB)


1
2
1
2
1
3
TRANSMISSION
AXLE

1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

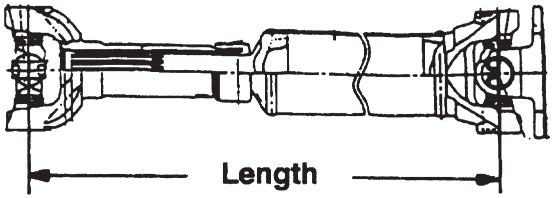
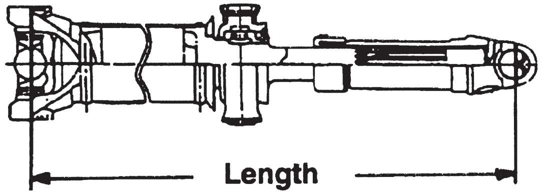
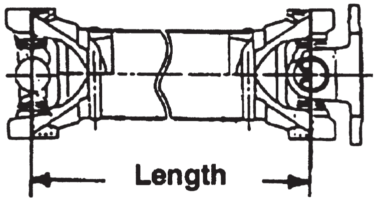
Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
109 in.	–	3.2º	–	8.3º
132.5 in.	0º	3.3º	2.6º	2.6º
150 in.	0º	3.3º	1.8º	1.7º
176 in.	0º	2.2º	0.4º	3.4º

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Wheelbase	**109**	**132.5**	**150**	**176**
No. of Shafts	1	2	2	2
Trans. Type	Automatic Transmission	Automatic Transmission	Automatic Transmission	Automatic Transmission
Shaft #1 O.D.	3.0			
Thickness	0.083			
Length	34.83	24.1	41.85	52.1
Type	A	B	B	B
Shaft #2 O.D.	3.0			3.5
Thickness	N/A	0.083		
Length	N/A	33.46	33.46	49.2
Type	N/A	C	C	C

Type	**Description**	**Illustration**
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

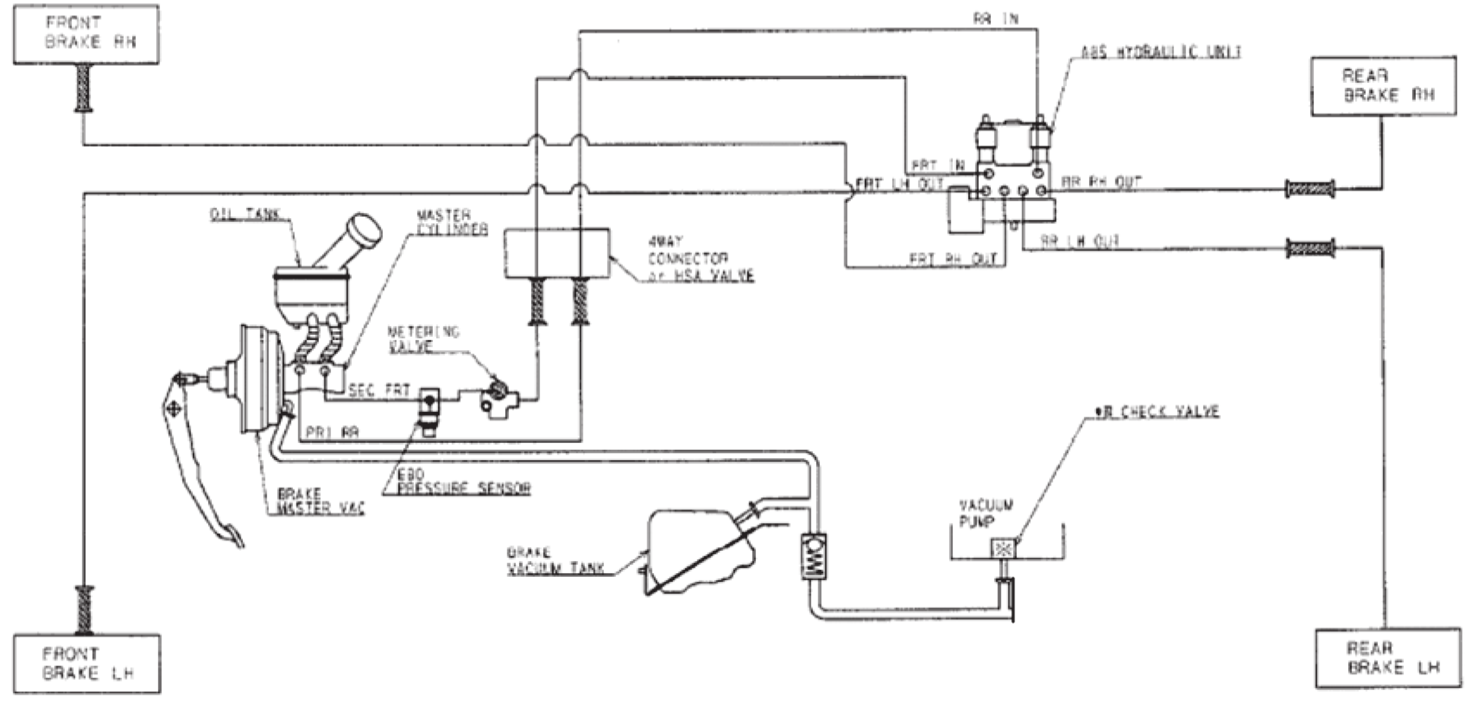
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Brake System Diagram, 12,000 GVW

Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
OIL TANK
MASTER CYLINDER
4WAY CONNECTOR or HSA VALVE
FRT RH OUT
RR LH OUT
METERING VALVE
SEC FRT
PRI RR
EBD PRESSURE SENSOR
BRAKE MASTER VAC
OR CHECK VALVE
VACUUM PUMP
BRAKE VACUUM TANK
FRONT BRAKE LH
REAR BRAKE LH

NPR/W3500 GAS , 12.000 GVW

INDICATION	▨	▭	—	═	(→) ⊡ (→)
NAME	BRAKE HOSE HIGHT PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	VACUUM LINE	CHECK VALVE (ONE WAY VALVE)

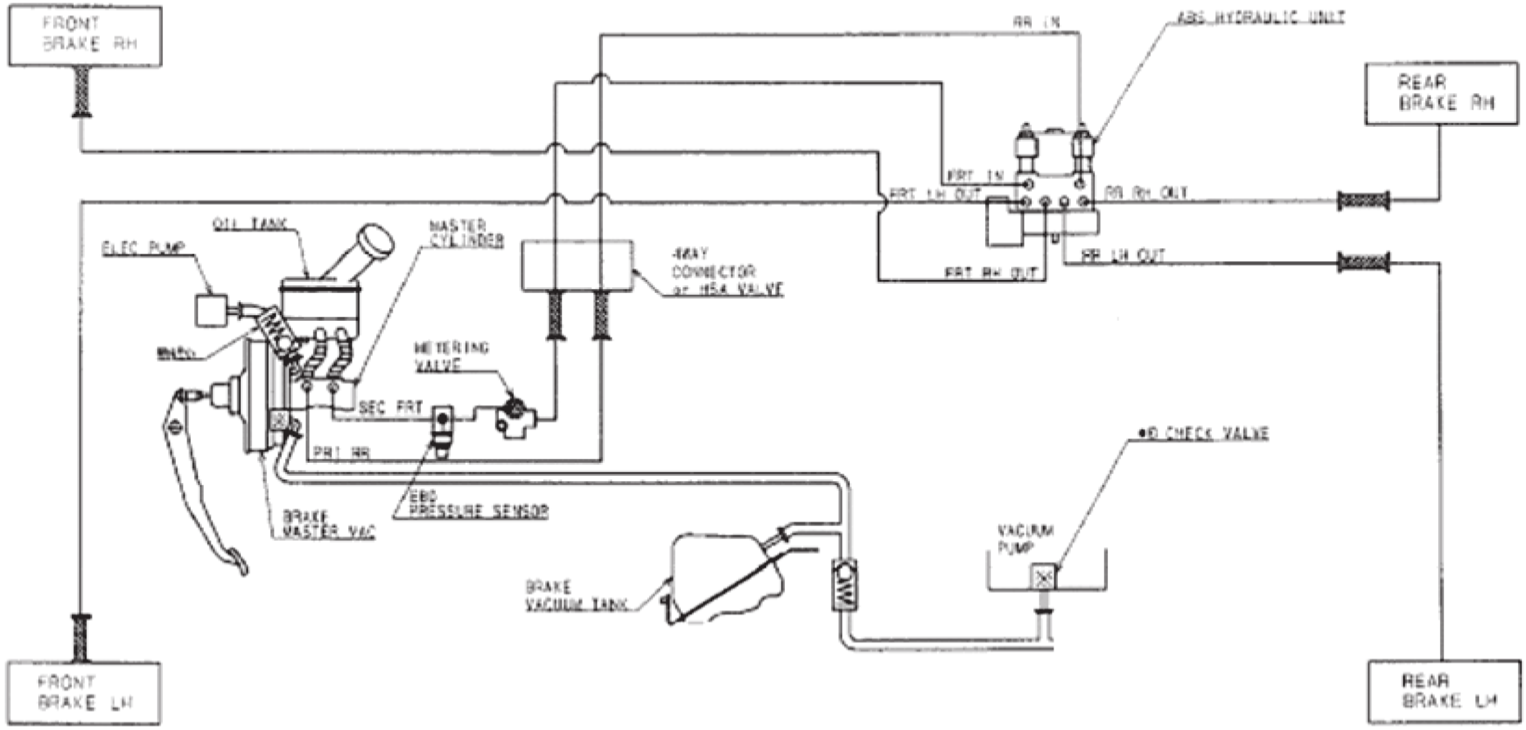
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Brake System Diagram, 14,500 GVW

Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
RR LH OUT
FRT RH OUT
OIL TANK
MASTER CYLINDER
ELEC PUMP
4WAY CONNECTOR or HSA VALVE
METERING VALVE
SEC FRT
PRI RR
EBD PRESSURE SENSOR
BRAKE MASTER VAC
CHECK VALVE
VACUUM PUMP
BRAKE VACUUM TANK
OWV
FRONT BRAKE LH
REAR BRAKE LH

NPR-HD/W4500 GAS 14,500 GVW

INDICATION	▨	▥	—	═	(→) OWV (→)
NAME	BRAKE HOSE HIGHT PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	VACUUM LINE	CHECK VALVE (ONE WAY VALVE)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Through the Rail Fuel Fill

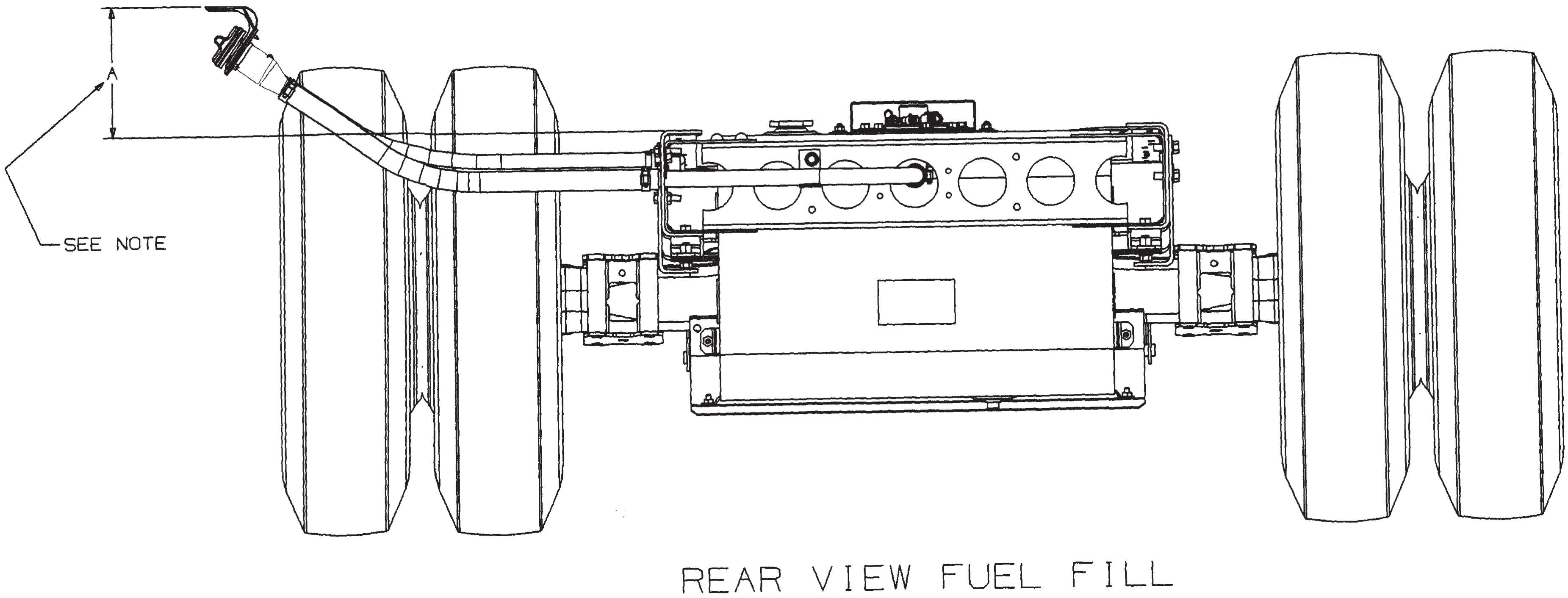
Installation Instructions

1. Disconnect battery.
2. Remove the short filler hose and the short breather hose from the breather and fuel filler pipes and the filler neck bracket assembly.
3. Filler kit hoses are designed for the 96 inch wide body width. Modify the hoses as required to fit dimension "E" of the desired body width (see page 104)
4. Install flexible filler hose (item 2) to fuel filler pipe and filler neck bracket assembly using existing screw clamps.
5. Install flexible breather hose (item 3) to fuel breather pipe and filler neck bracket assembly using new clamps (item 4)
6. The filler neck must be mounted to allow the filler neck bracket to be parallel to the frame horizontal.
7. Filler neck (Dimension A) must be between 6.85 inches and 8.85 inches above frame.
8. Secure the filler plate to the bottom of the body and check for leaks.
9. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
10. Reconnect battery.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Rear View Fuel Fill

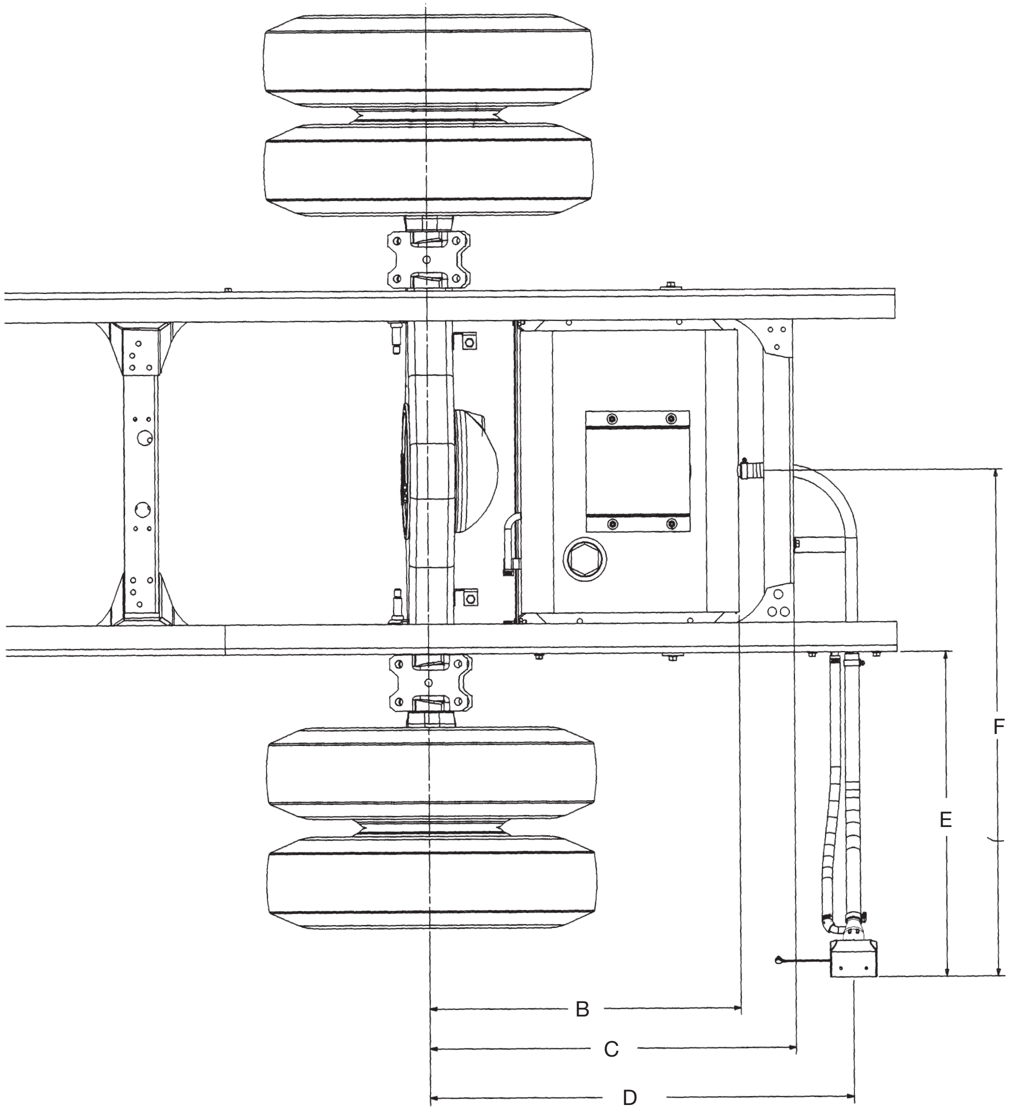


Dimension A = 6.85-8.85 inches (174-216 mm)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Top View Fuel Fill

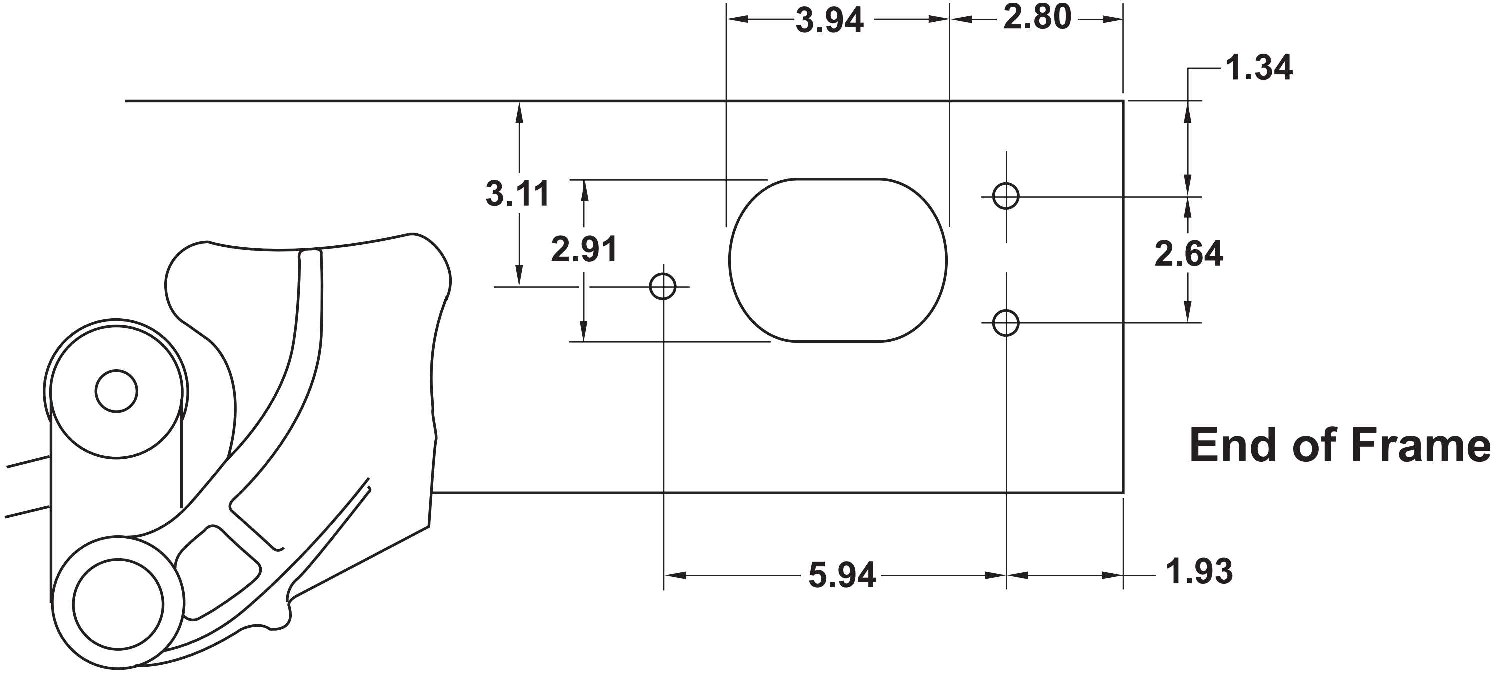


Dimensions:
B = 29.75 inches (756 mm)
C = 34.00 inches (863 mm)
D = 39.29 inches (998 mm)
E = 33.86 inches (860 mm)
F = 59.60 inches (1,514 mm)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

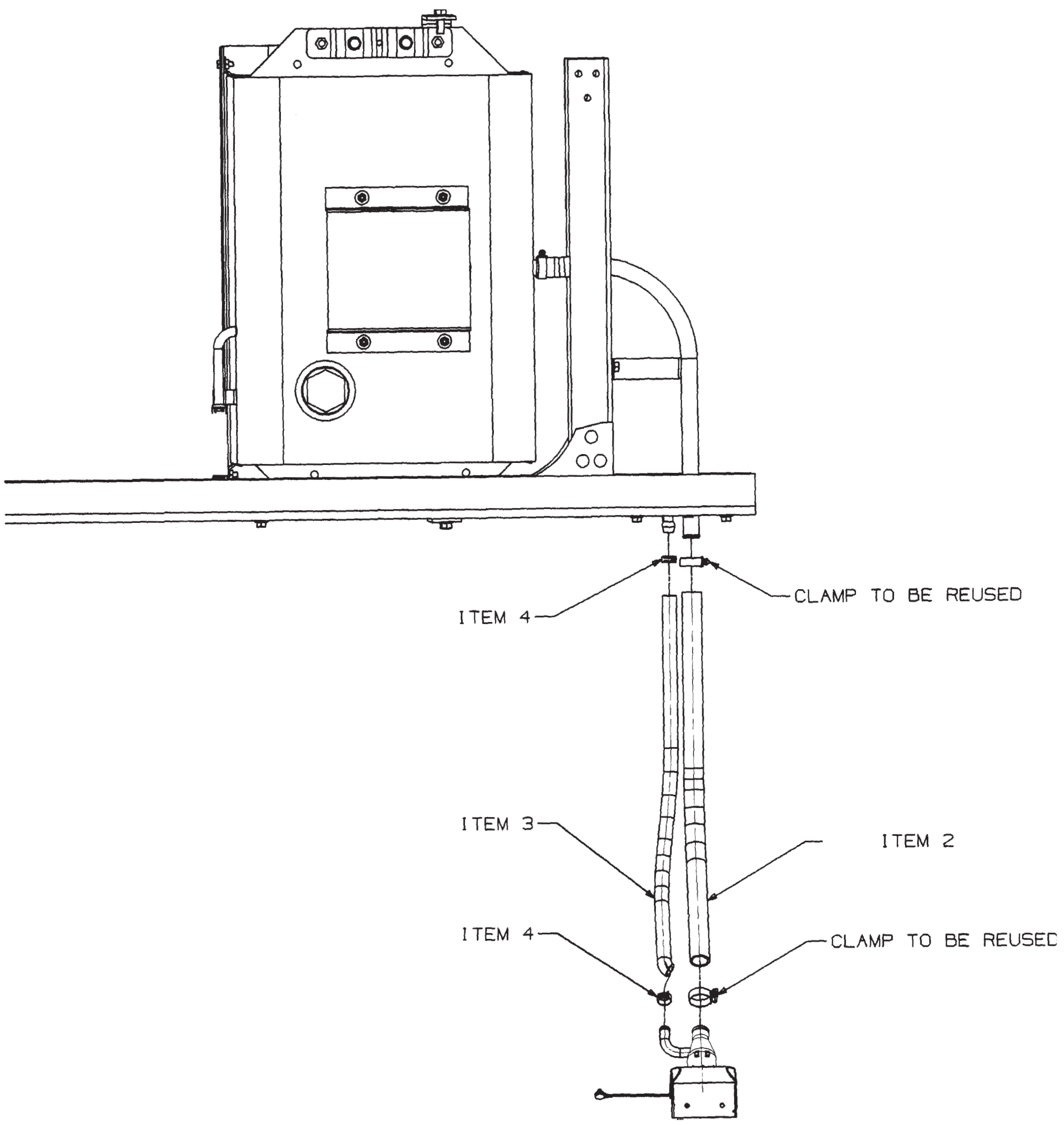
Through the Rail Fuel Fill Frame Hole


3.94
2.80
1.34
3.11
2.91
2.64
End of Frame
5.94
1.93

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Fuel Fill Parts Illustration


ITEM 4
CLAMP TO BE REUSED
ITEM 3
ITEM 2
ITEM 4
CLAMP TO BE REUSEC

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas – continued from previous page)

Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
PARTS				
2	Hose, Fuel Filler	897378-5370	97378537	1
3	Hose, Breather	897378-5360	97378536	1
4	Clamp, Rubber Hose	815699-8250	15699825	2

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NPR/W3500, NPR HD/W4500 Diesel

Specifications

Model	NPR/W3500 Diesel	NPR HD/W4500 Diesel
GVWR	14,500 lbs.	14,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.	
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel	
Model/Displacement	4HK1-TC/317 CID (5.19 liters)	
HP (Gross)	205 HP @ 2,400 RPM	
Torque (Gross)	441 lbs.-ft. torque @ 1,850 RPM	
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 in.^{2} radiator; 7-blade 20.1 in. diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature and low coolant level. Engine cruise control and idle up function Rear egine cover.	
Transmission*	Aisin A465, 6-speed overdrive automatic transmission with lock-up capability in 2nd through 6th, and PTO capability.	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot “I”-Beam rated at 6,380 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	5,360 lbs.	5,360 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 11,020 lbs.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	8,840 lbs.	9,880 lbs.
Wheels	16 x 6.0-K 6-hole disc wheels, painted white.	
Tires	215/85R 16-E (10 pr) tubeless steel-belted radials, all-season front and rear.	
Brakes	Dual-circuit, vacuum-assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is a mechanical, cable-actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum-operated. Four channel antilock brake system	

NOTE: These selected specifications are subject to change without notice. *All Transmissions have a PTO gear in all wheelbases.

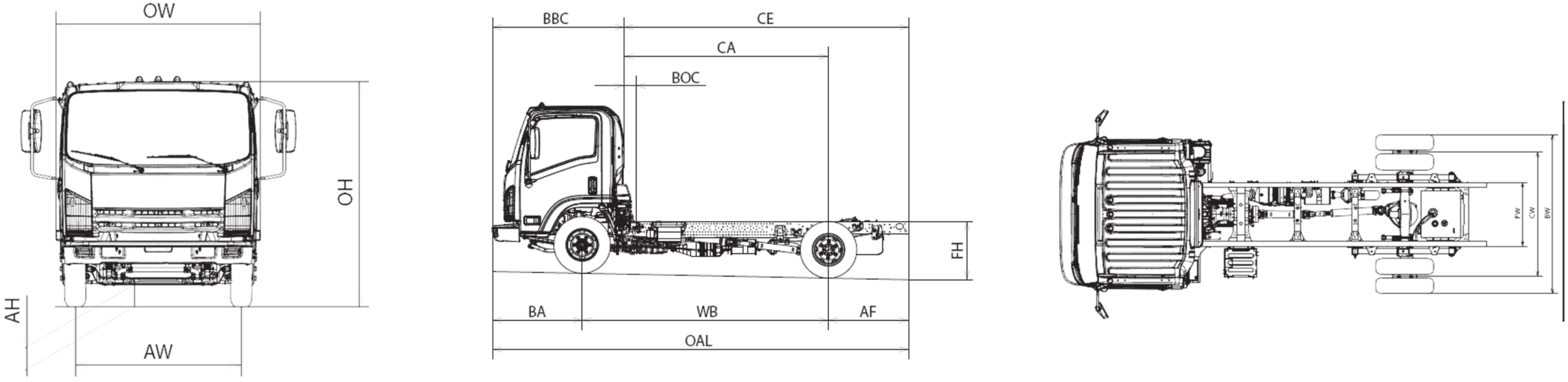
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Model	NPR/W3500 Diesel	NPR HD/W4500 Diesel
Fuel Tank	30-gallon rectangular steel fuel tank mounted in frame rail behind rear axle. Heated fuel/water separator mounted on rail with dash mounted indicator light.	
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in.^{3}, RBM 316,800 lbs.-ft./in. per rail.	
Cab	All-steel, low cab forward, BBC 66.8 in., 45° mechanical tilt with torsion assist.	
Equipment	TRICOT breatheable cloth covered high back driver's seat with two-occupant passenger seat. Dual cab mounted exterior mirrors wit integral convex mirror. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.	
Electrical	12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110-amp alternator with integral regulator.	
Options	AM/FM CD stereo radio, engine block heater; engine oil pan heater; fuel tank mounted on right hand rail (33 gallon); spare wheel; 6" stainless steel convex mirrors. Power windows and door locks, wheel simulators, engine shutdown system, engine shutdown system with hourmeter, auxilary transmission oil cooler, air conditioning, PTO enable switch, back up alarm.	

NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings



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(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Variable Chassis Dimensions

Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

* Effective CA & CE are CA or CE less BOC.

Dimension Constants

Code	Inches	Code	Inches	Code	Inches
AH	8.6	BW	83.3	FH	32.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	90.0		
BOC	6.5	OW	81.4		

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

In-Frame Tank 12,000-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NB1	109.0 in.	lb.	3,752	1,967	5,719	6,621
NB2	132.5 in.	lb.	3,827	1,932	5,759	6,566
NB3	150.0 in.	lb.	3,876	1,920	5,796	6,500
NB4	176.0 in.	lb.	3,939	1,912	5,851	6,400

In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NF1	109.0 in.	lb.	3,704	2,004	5,708	9,110
NF2	132.5 in.	lb.	3,805	1,978	5,783	9,033
NF3	150.0 in.	lb.	3,858	1,962	5,820	8,966
NF4	176.0 in.	lb.	3,927	1,948	5,875	8,889

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Side-Mounted Tank 12,000-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NB1	109.0 in.	lb.	3,960	1,712	5,672	6,698
NB2	132.5 in.	lb.	4,015	1,733	5,748	6,643
NB3	150.0 in.	lb.	4,052	1,747	5,799	6,577
NB4	176.0 in.	lb.	4,095	1,765	5,860	6,477

Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NF1	109.0 in.	lb.	3,982	1,773	5,755	9,187
NF2	132.5 in.	lb.	4,043	1,788	5,831	9,110
NF3	150.0 in.	lb.	4,083	1,799	5,882	9,044
NF4	176.0 in.	lb.	4,130	1,813	5,943	8,967

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Vehicle Weight Limits:

GVWR		
Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	5,360 lbs.	5,360 lbs.
GAWR, Rear	8,840 lbs.	9,880 lbs.

Technical Notes:

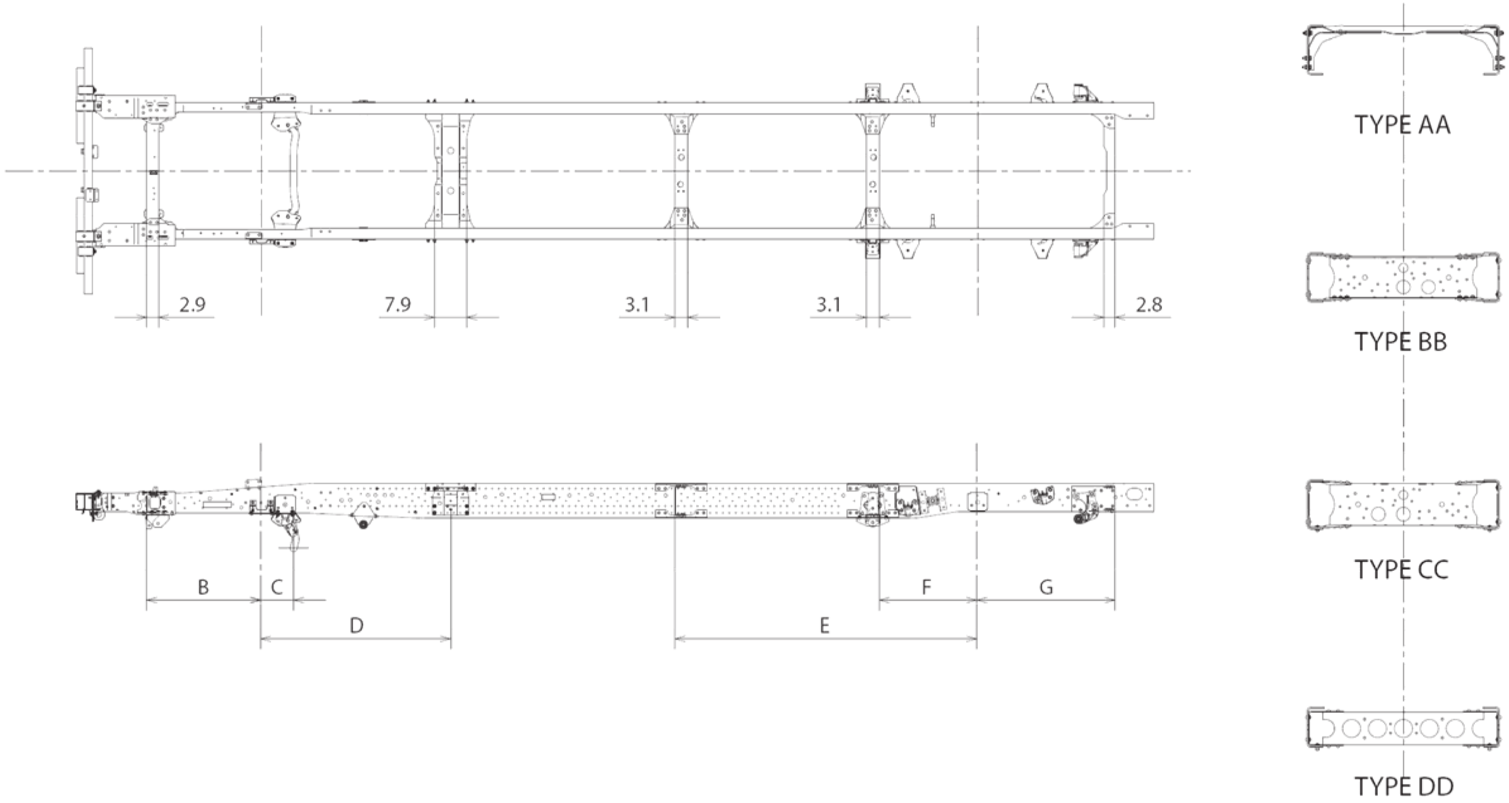
Chassis Curb Weight reflects standard equipment and fuel but no driver or payload.

Maximum Payload Weight is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

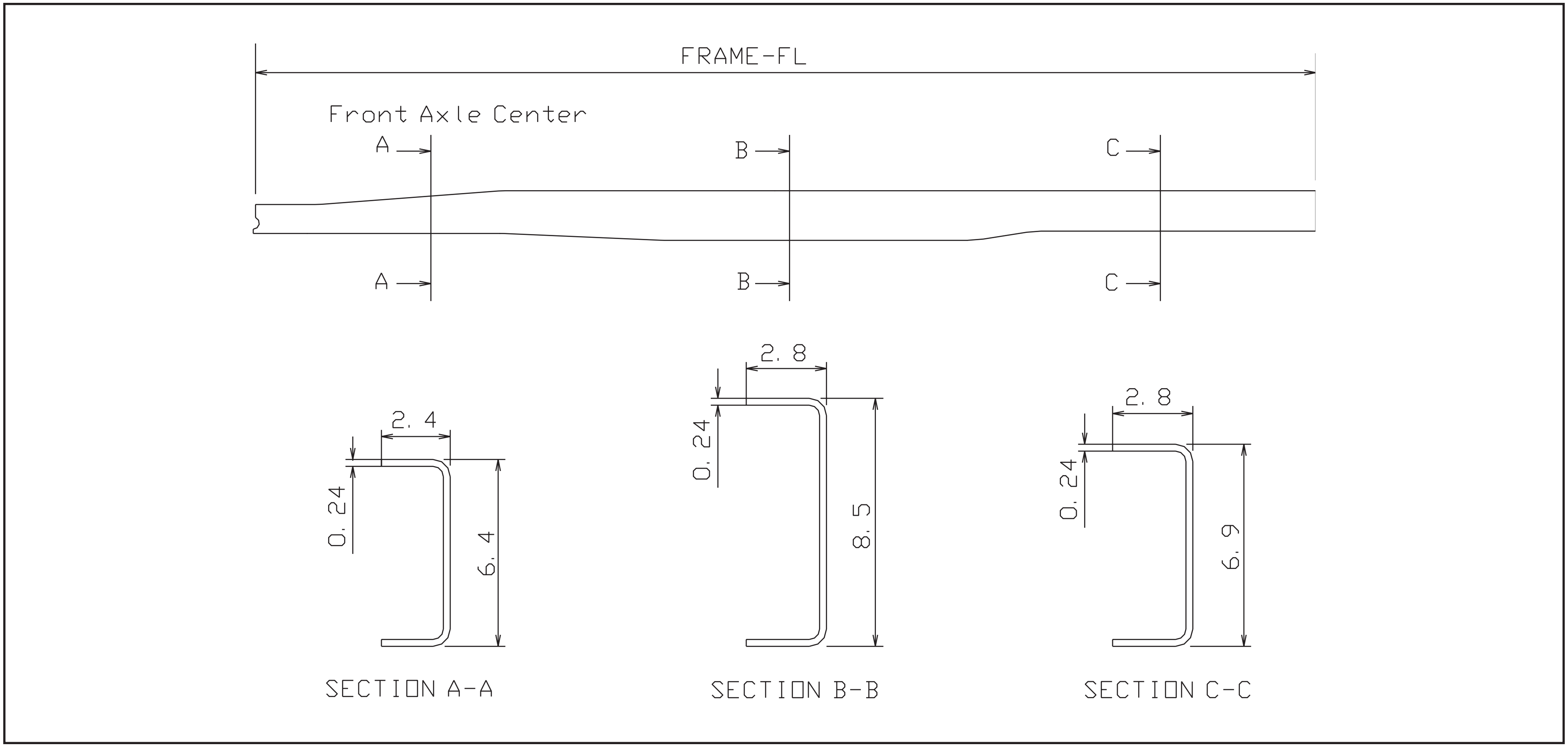
Frame and Crossmember Specifications


2.9
7.9
3.1
3.1
2.8
B
C
D
E
F
G
TYPE AA
TYPE BB
TYPE CC
TYPE DD

Wheelbase	Frame Thickness	Crossmember Type/Location									
		B	C	D		E		F		G	
109	0.24	28.3	7.9	AA	46.5	-		CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	CC	24.2	DD	33.8

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Frame Chart

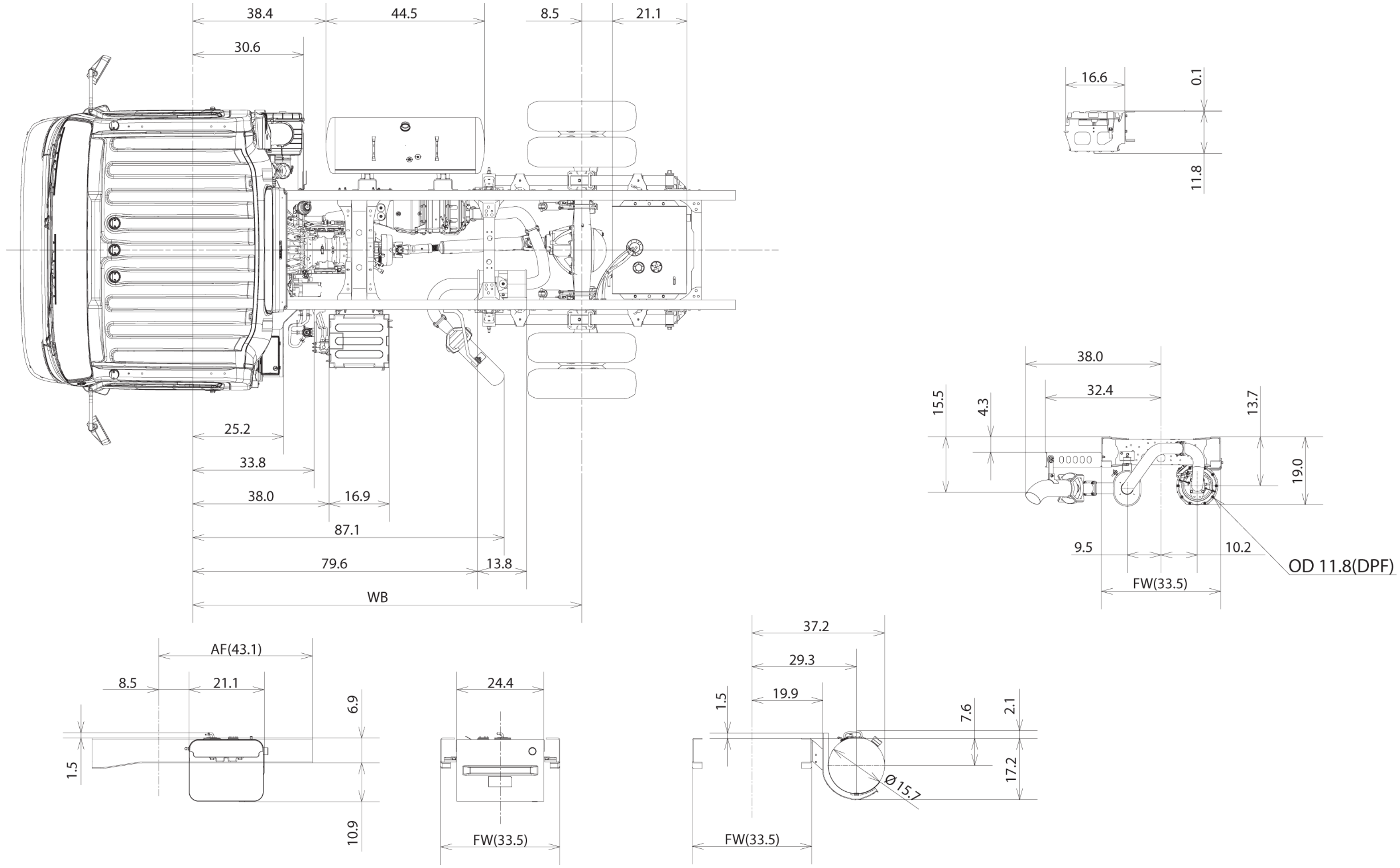

FRAME-FL
Front Axle Center
A
B
C
A
B
C
2. 4
0. 24
6. 4
2. 8
0. 24
8. 5
2. 8
0. 24
6. 9
SECTION A-A
SECTION B-B
SECTION C-C

Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Auxiliary Views 109" Wheelbase

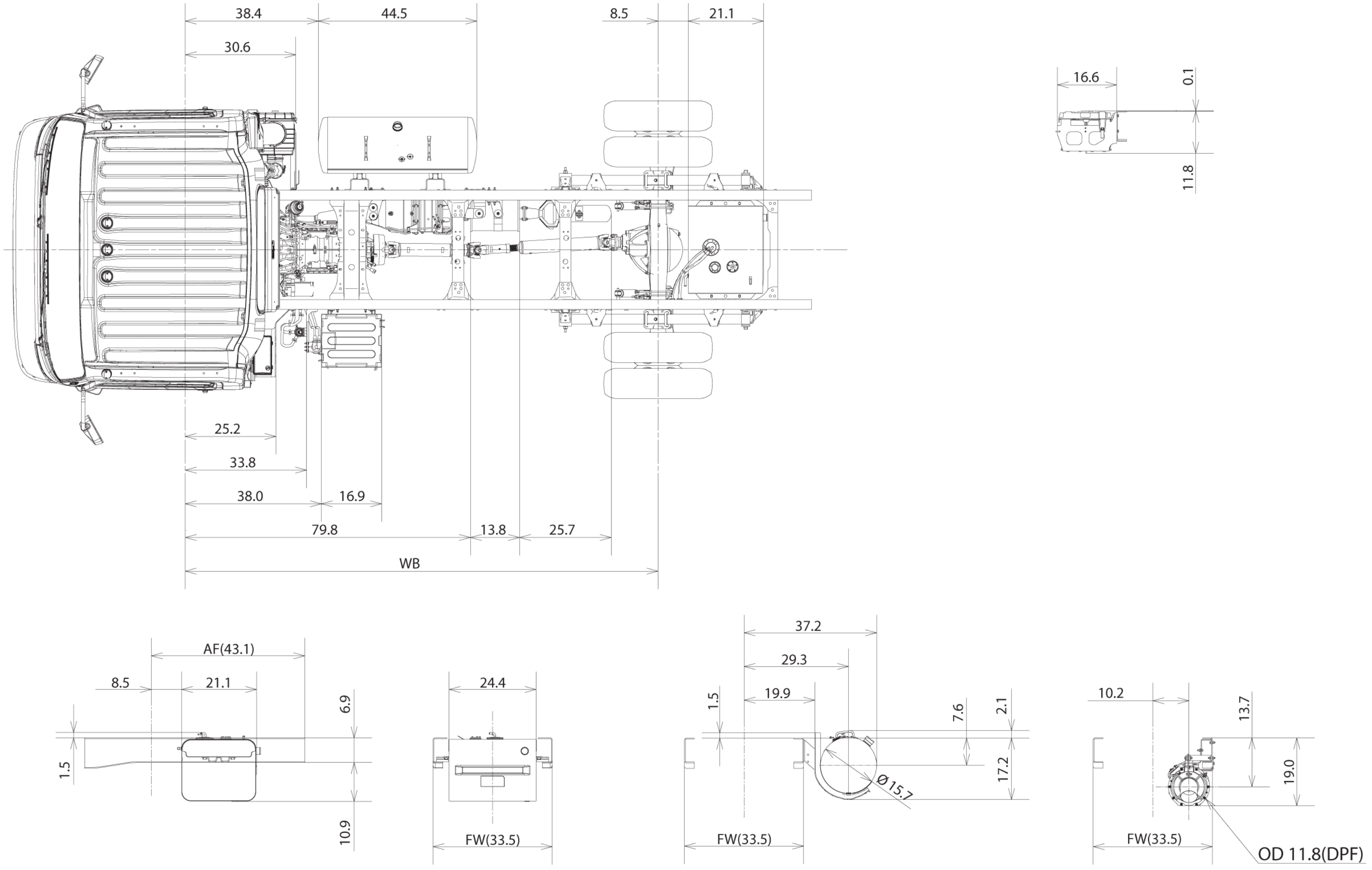

38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
87.1
79.6
13.8
WB
38.0
32.4
15.5
4.3
13.7
19.0
9.5
10.2
OD 11.8(DPF)
FW(33.5)
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Auxiliary Views 132.5" Wheelbase

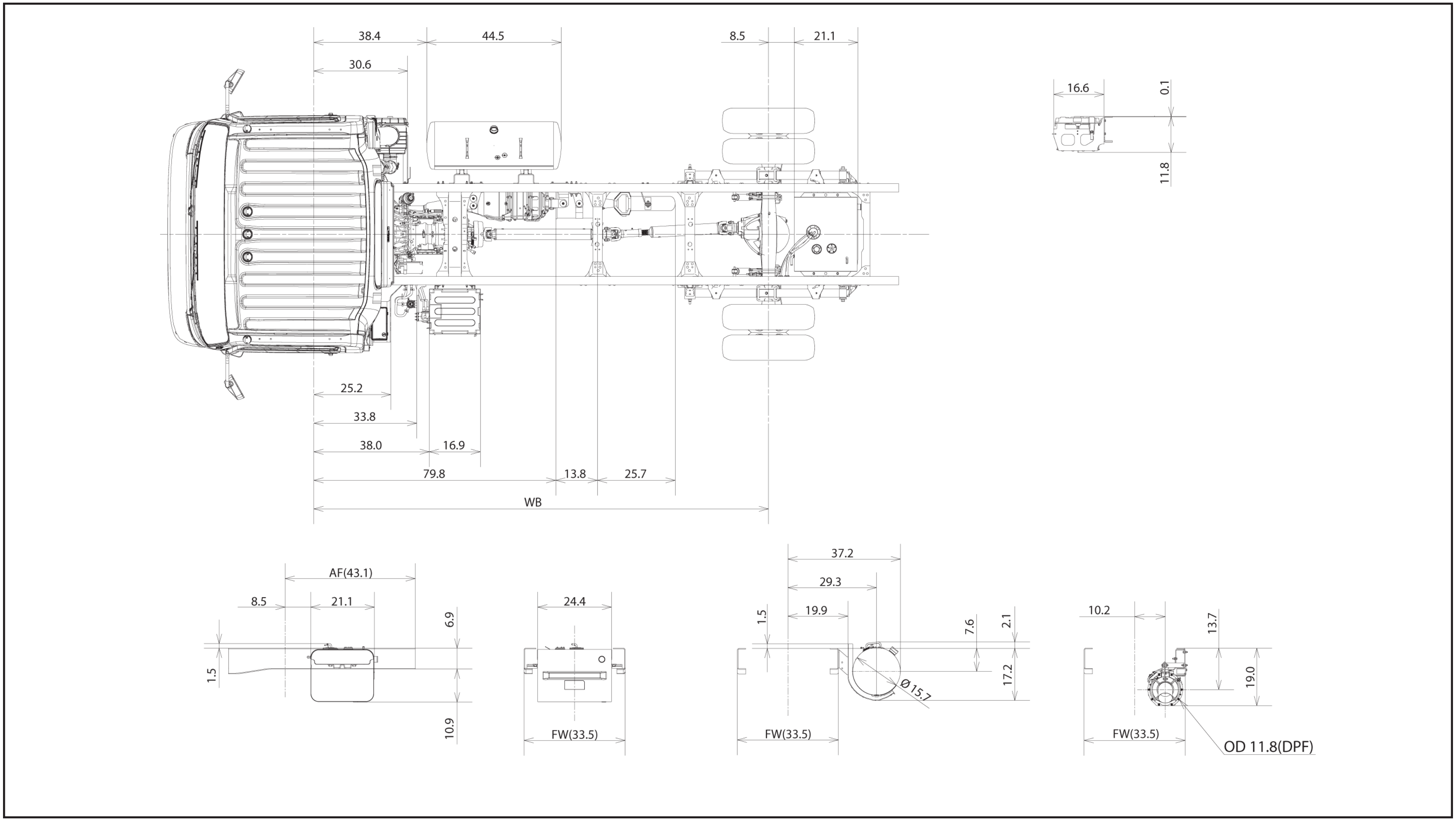

38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Auxiliary Views 150" Wheelbase


38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø 15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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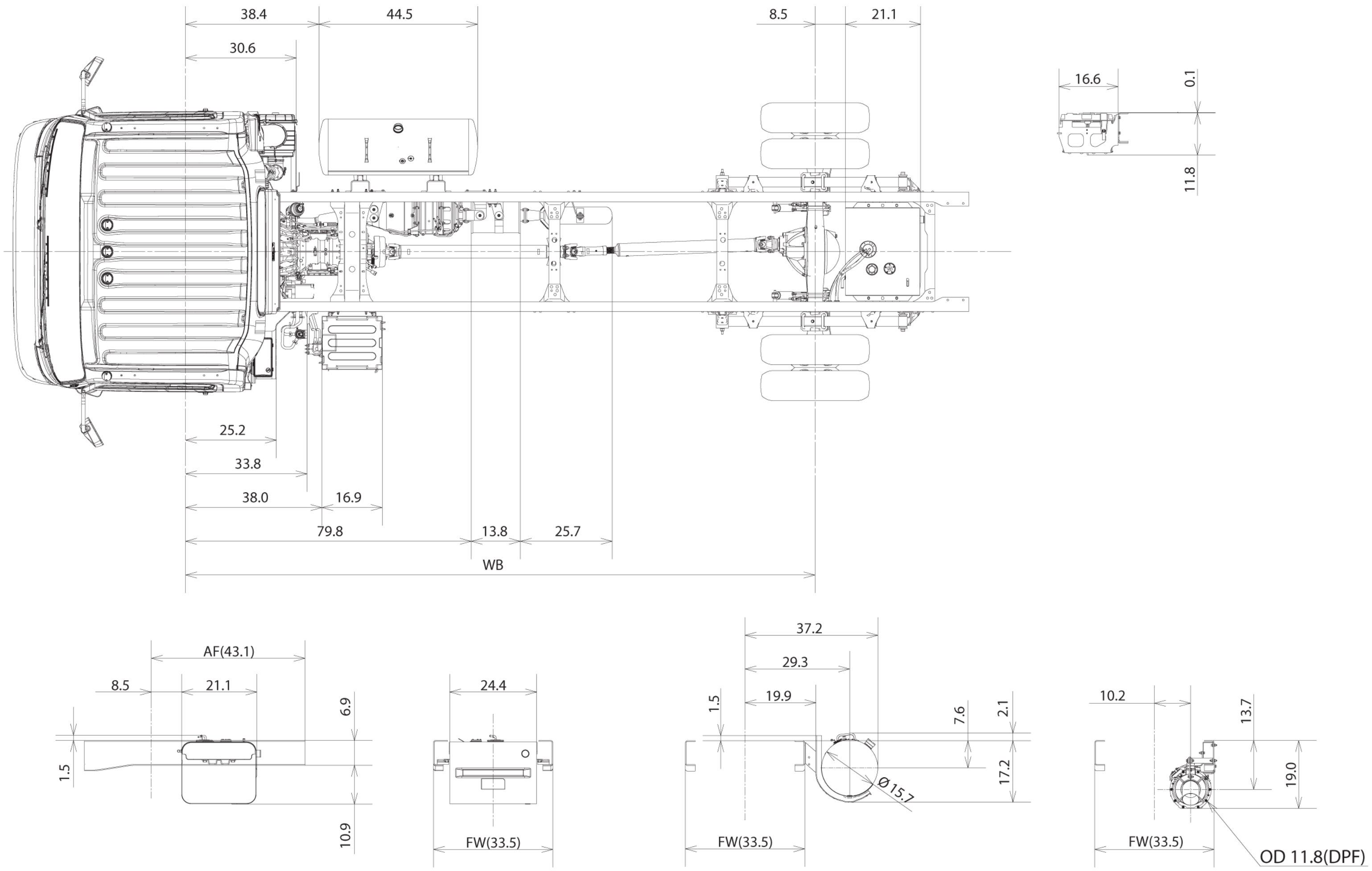
Auxiliary Views 176" Wheelbase


38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

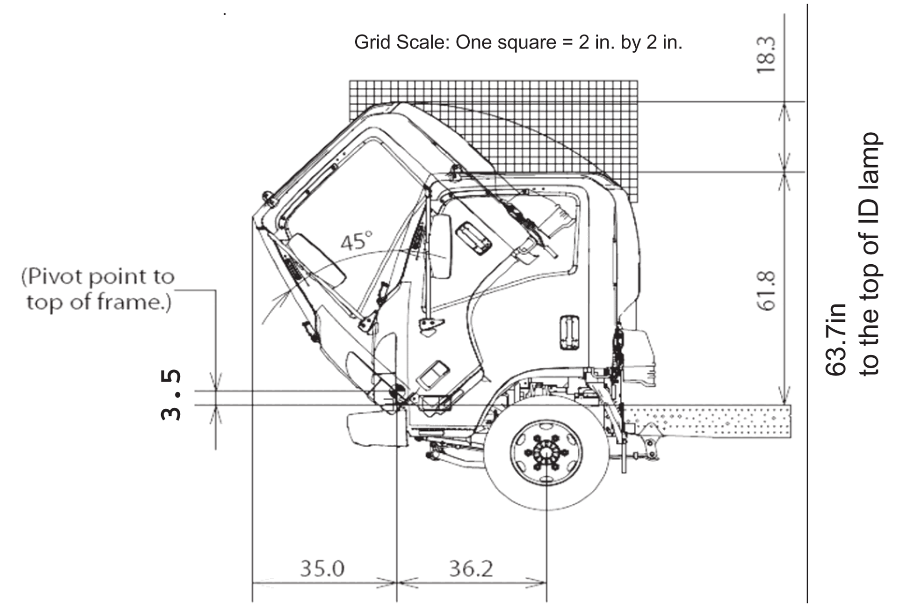
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

Body Builder Weight Information Chart

Body Builder Weight Information Chart

GVWR	AXLE	Wheelbase								UNSPRUNG WEIGHT
		109		132.5		150		176		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
17950	FRONT	3936	4167	4063	4249	4129	4301	4214	4362	661
	REAR	2317	2034	2266	2028	2236	2027	2206	2027	1190
	TOTAL	6253	6201	6329	6277	6365	6328	6420	6389	1851

Cab Tilt


Grid Scale: One square = 2 in. by 2 in.
45°
(Pivot point to top of frame.)
3.5
18.3
61.8
63.7in to the top of ID lamp
35.0
36.2

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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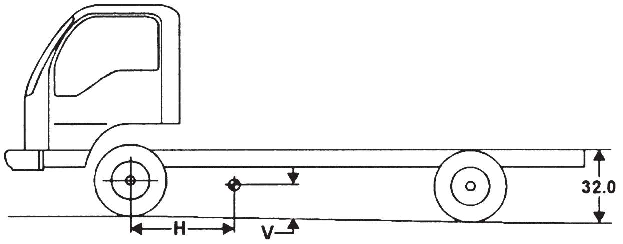
Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
12,000	109	23.8	37.5	32.9
	132.5	23.7	44.5	39.9
	150	23.6	49.7	45.2
	176	23.6	57.5	53.0
14,500	109	23.8	38.3	33.6
	132.5	23.7	45.3	40.6
	150	23.7	50.6	45.9
	176	23.6	58.4	53.7



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 12,000 lb. GVWR, 63 inches above ground level for the 14,500 GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the N/W Series are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by GMICT Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-678-240-9818.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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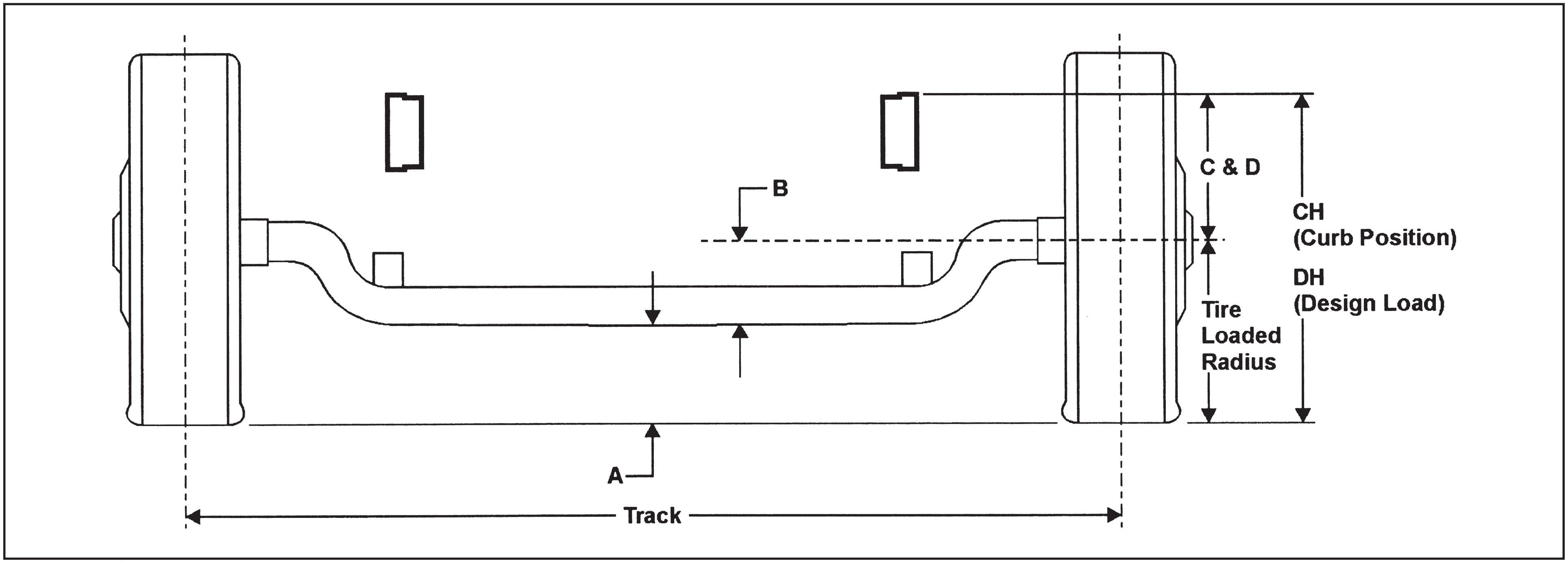
Front Axle Chart



Formulas for calculating height dimensions:

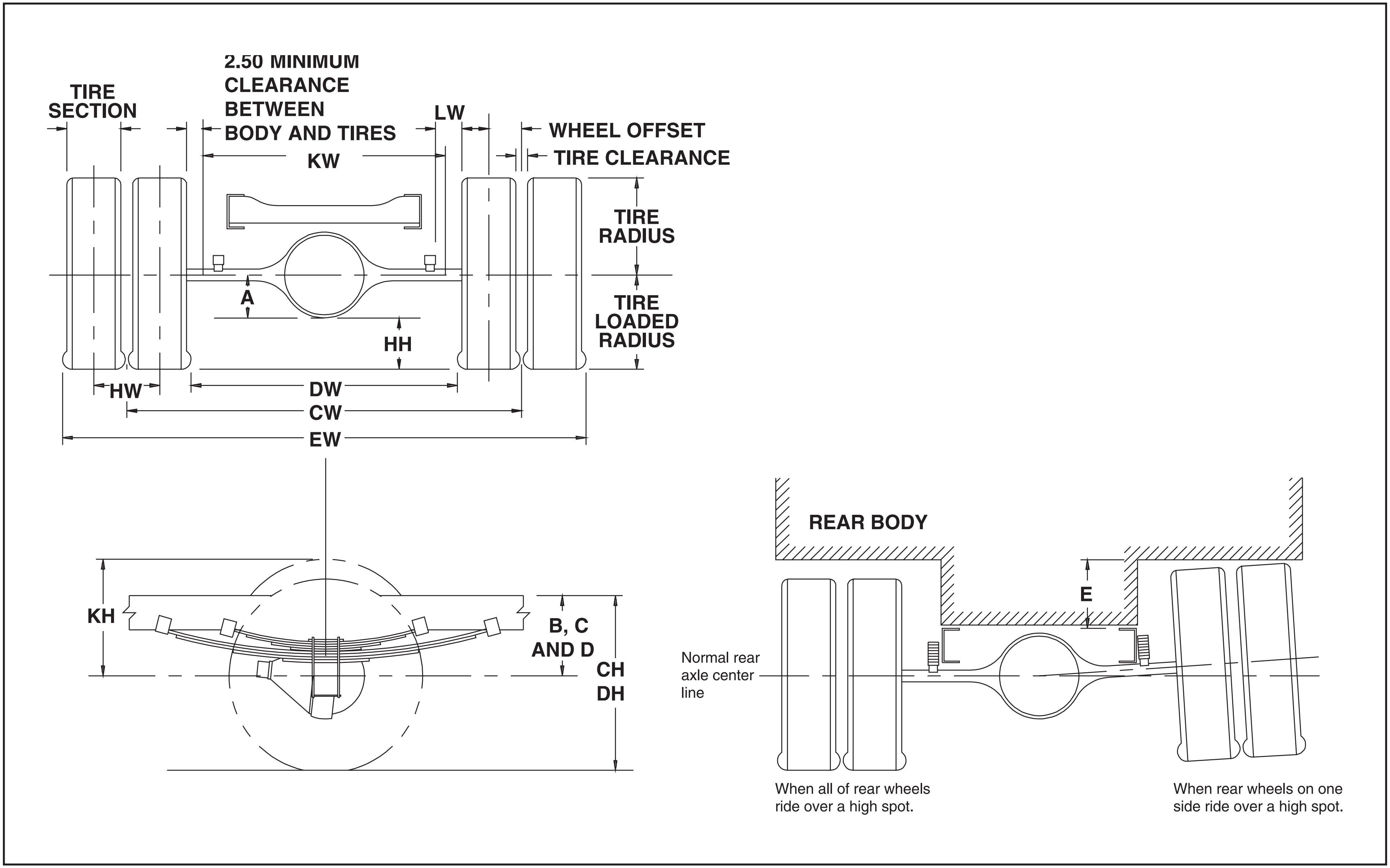
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	5,360 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1
	14,500 lbs.	5,360 lbs.	7.5	6.6	12.8	11.7	27.4	25.8	65.5	14.6	14.1

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Rear Axle Chart


TIRE SECTION
2.50 MINIMUM CLEARANCE BETWEEN BODY AND TIRES
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE RADIUS
A
TIRE LOADED RADIUS
HH
HW
DW
CW
EW
KH
B, C AND D
CH
DH
REAR BODY
E
Normal rear axle center line
When all of rear wheels ride over a high spot.
When rear wheels on one side ride over a high spot.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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Definitions			
A	Centerline of axle to bottom of axle bowl.	DW	Minimum distance between the inner surfaces of the rear tires.
B	Centerline of axle to top of frame rail at metal-to-metal position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
C	Centerline of axle to top of frame rail at curb position.		
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.		
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance	See Tire Chart for Values	

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	8,840/9,880 lbs.	65.0	6.5 (A/T)	9.3 (A/T)	15.4	13.3/13.0	7.8

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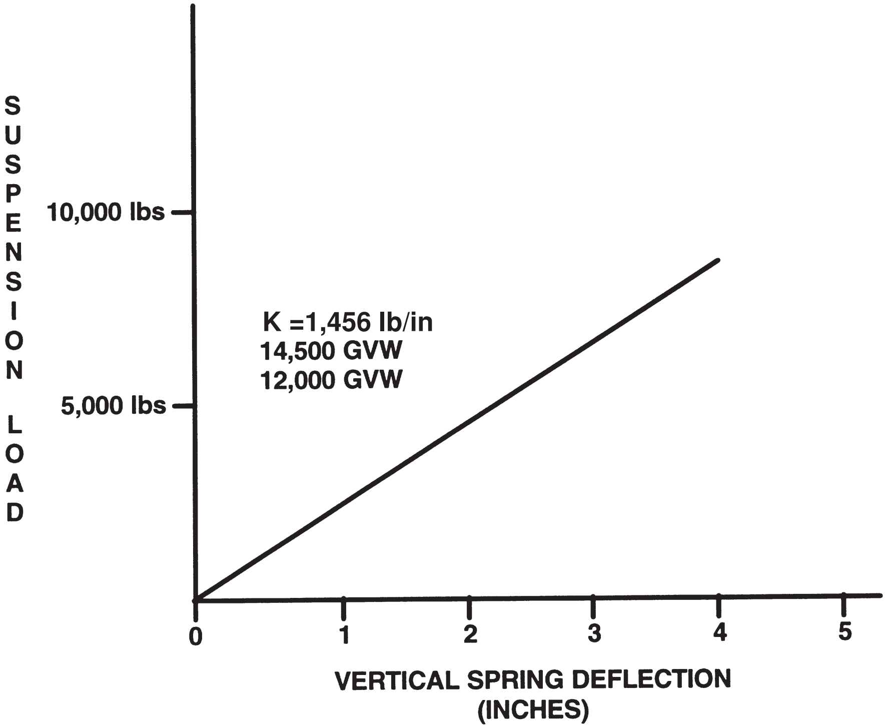
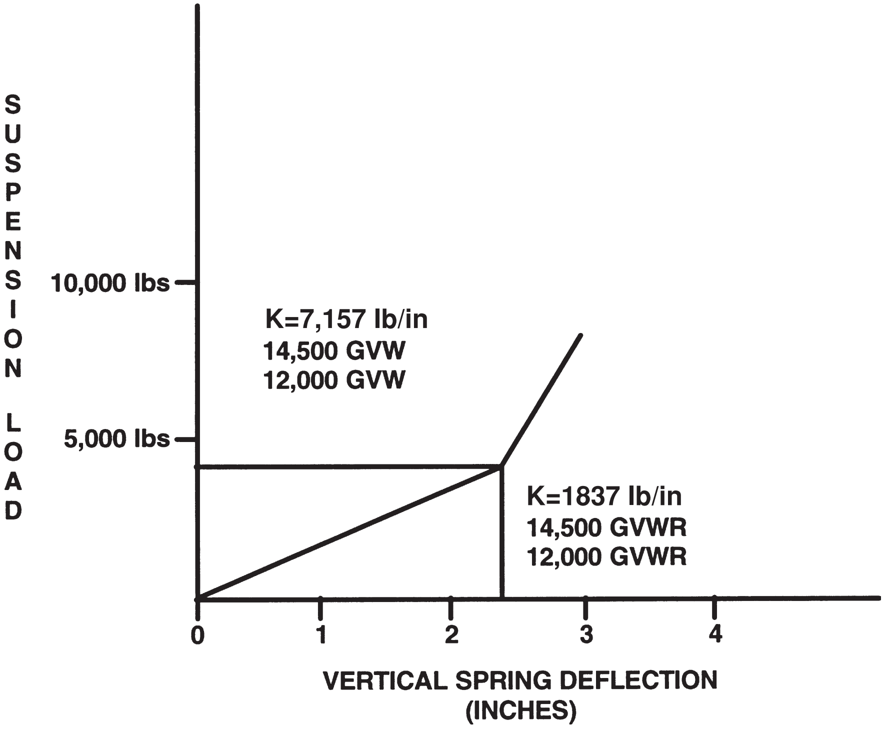
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Suspension Deflection Charts

Front Leaf Spring Load vs. Deflection (Per Axle)



Rear Leaf Spring Load vs. Deflection (Per Axle)



(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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Tire and Disc Wheel Chart

Tire

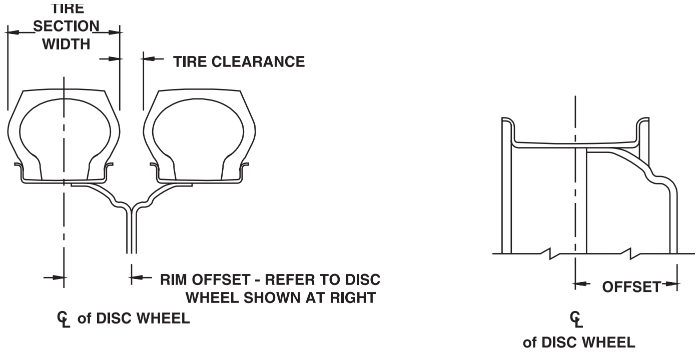
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16-E	2,680	80	2,470	80	5,360	9,880	12,000
215/85R 16-E	2,680	80	2,470	80	5,360	9,880	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16-E	12,000	14.1	14.1	14.6	14.6	8.2	1.8	6.0
215/85R 16-E	14,500	14.1	14.1	14.6	14.6	8.2	1.8	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	5° DC	Steel TOPY

* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

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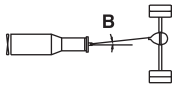
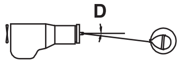
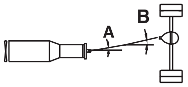
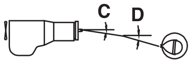
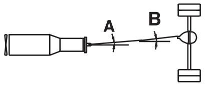
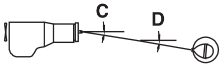
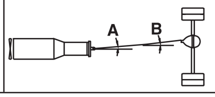
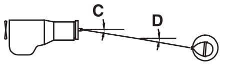
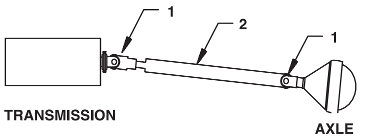
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Propeller Shaft

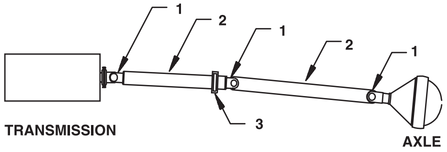
WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(109 in WB)



(132.5 in, 150 and 176 in WB)



1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

Wheelbase	Plane View		Side View	
	A	B	C	D
	Auto. Trans.	Auto. Trans.	Auto. Trans.	Auto. Trans.
109 in.	—	3.2º	—	8.3º
132.5 in.	0º	3.3º	2.6º	2.6º
150 in.	0º	3.3º	1.8º	1.7º
176 in.	0º	2.2º	0.4º	3.4º

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

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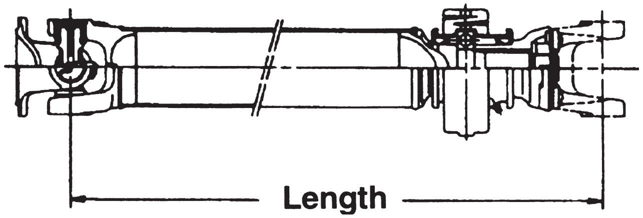
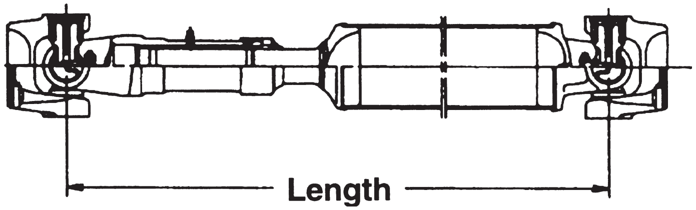
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

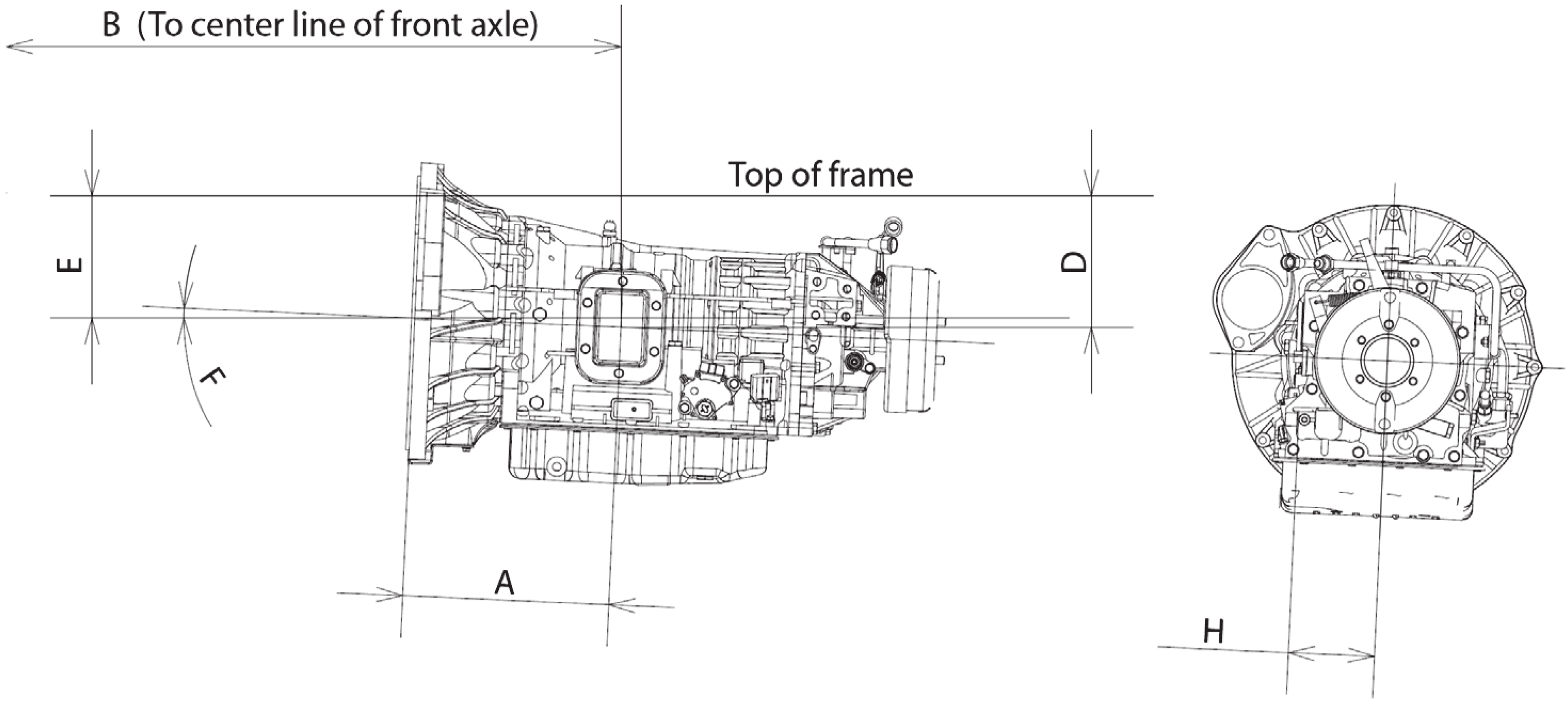
Trans. Type	6 Automatic. Transmission			
Wheelbase	**109**	**132.5**	**150**	**176**
No. of Shafts	1	2	2	2
Shaft #1 O.D.	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126
Length	37.2	24.5	41.8	51.3
Type	B	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126
Length	N/A	36.1	36.4	52.9
Type	N/A	B	B	B

Type	Description	Illustration
Type **A**	1st shaft in 2-piece driveline	
Type **B**	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

PTO Location, Drive Gear and Opening Information

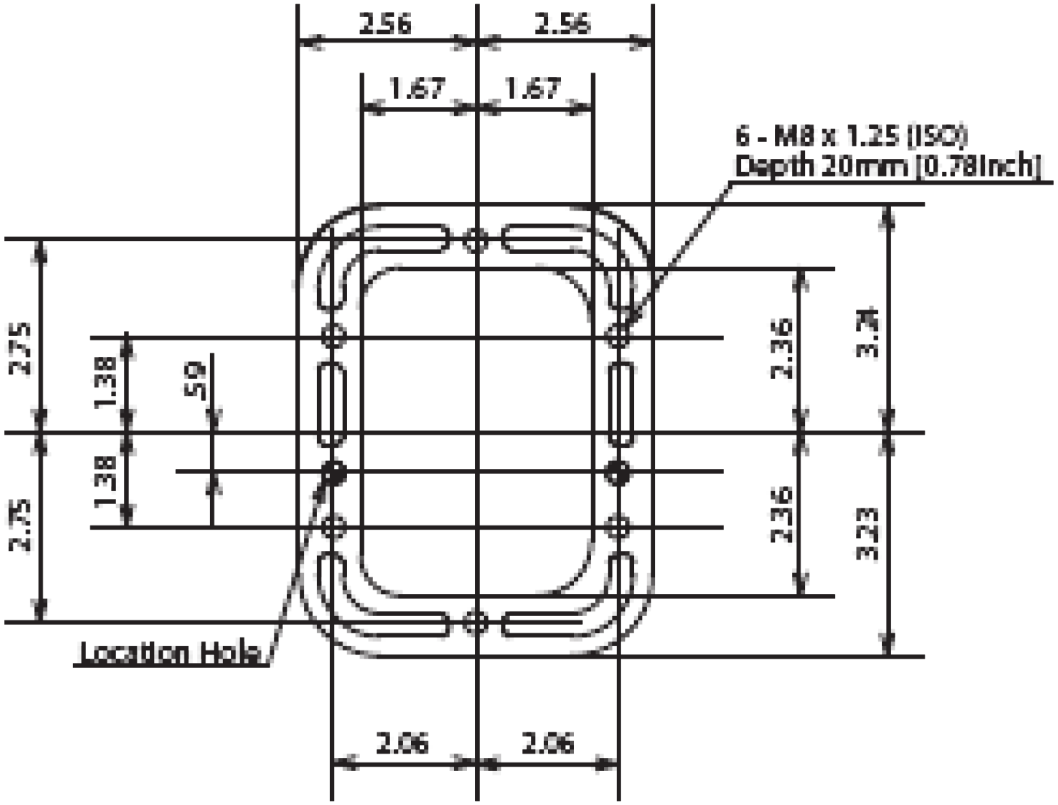

B (To center line of front axle)
Top of frame
E
F
D
A
H

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin 465	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5°	5.16	PTO Gear	1:1 with turbine	69	N/A	0	134 lbs.-ft. @ 1,700 RPM

Opening Diagram


2.56
2.56
1.67
1.67
6 - M8 x 1.25 (ISO)
Depth 20mm [0.78Inch]
2.75
2.75
1.38
1.38
.59
2.36
2.36
3.24
3.23
Location Hole
2.06
2.06

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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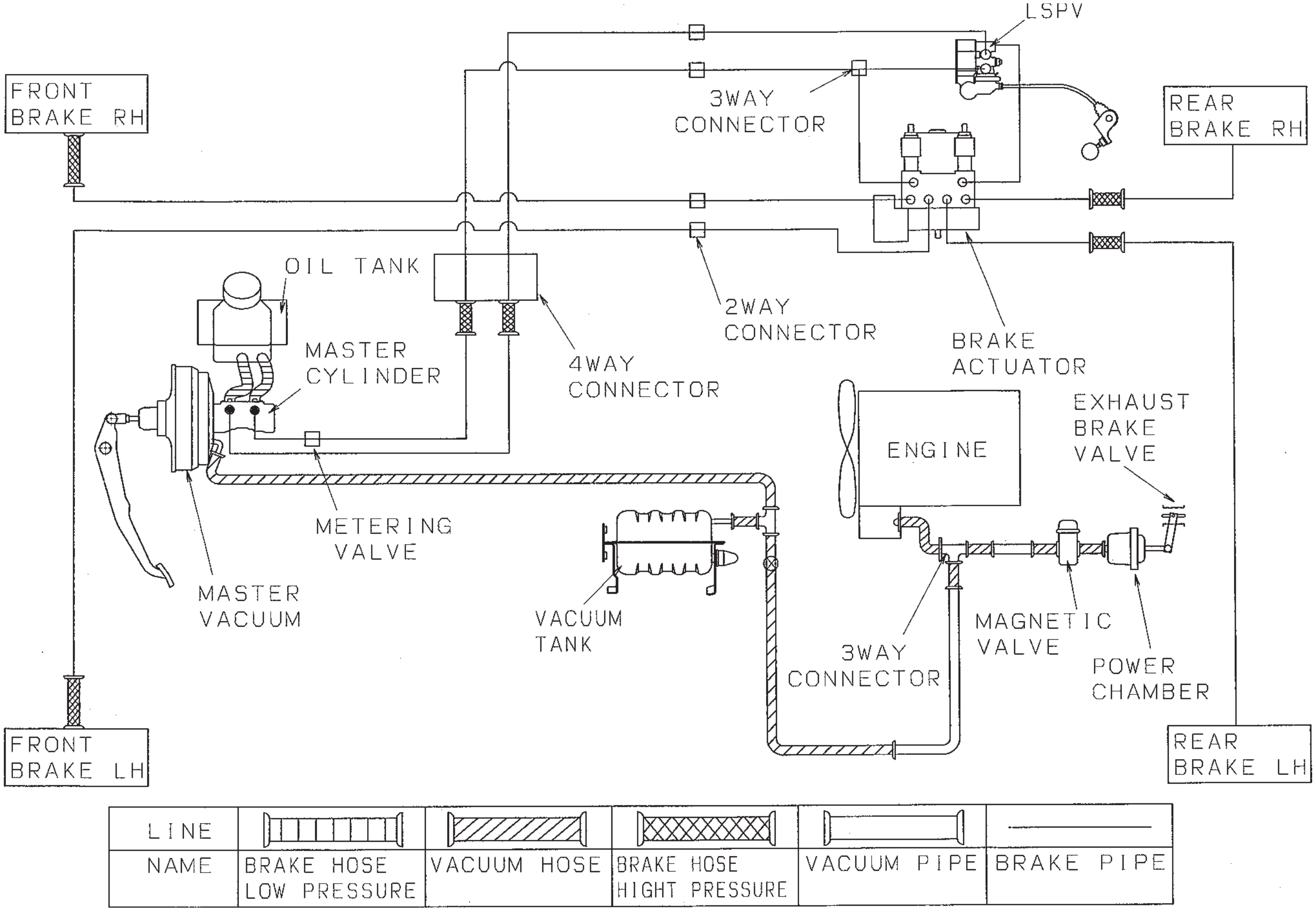
Brake System Diagram, 12,000 GVW

Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.


LSPV
FRONT BRAKE RH
3WAY CONNECTOR
REAR BRAKE RH
OIL TANK
2WAY CONNECTOR
BRAKE ACTUATOR
MASTER CYLINDER
4WAY CONNECTOR
EXHAUST BRAKE VALVE
ENGINE
METERING VALVE
MASTER VACUUM
VACUUM TANK
3WAY CONNECTOR
MAGNETIC VALVE
POWER CHAMBER
FRONT BRAKE LH
REAR BRAKE LH
LINE
NAME
BRAKE HOSE LOW PRESSURE
VACUUM HOSE
BRAKE HOSE HIGHT PRESSURE
VACUUM PIPE
BRAKE PIPE

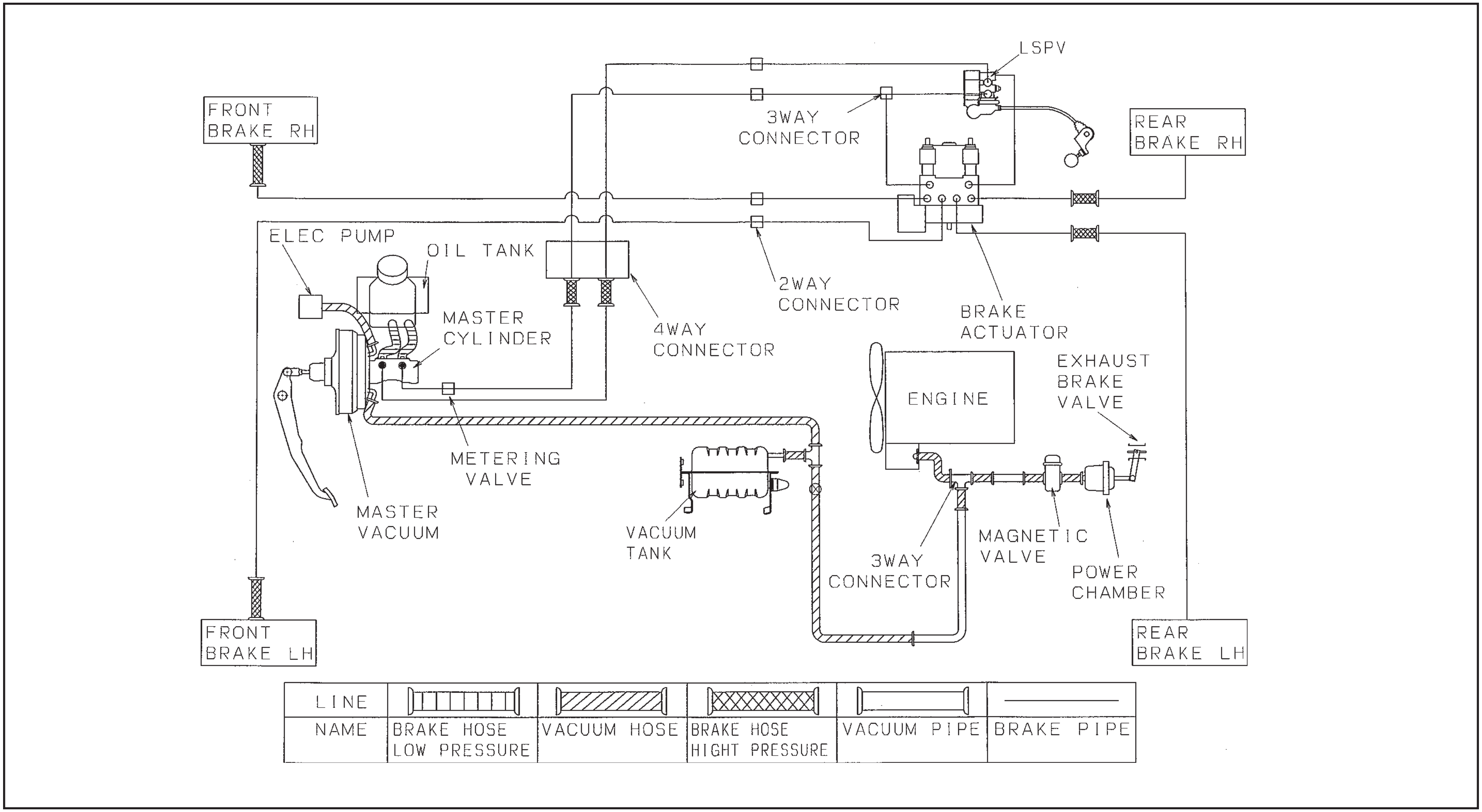
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Brake System Diagram, 14,500 GVW

Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.


LSPV
FRONT BRAKE RH
3WAY CONNECTOR
REAR BRAKE RH
ELEC PUMP
OIL TANK
2WAY CONNECTOR
MASTER CYLINDER
4WAY CONNECTOR
BRAKE ACTUATOR
EXHAUST BRAKE VALVE
ENGINE
METERING VALVE
MASTER VACUUM
VACUUM TANK
3WAY CONNECTOR
MAGNETIC VALVE
POWER CHAMBER
FRONT BRAKE LH
REAR BRAKE LH
LINE
NAME
BRAKE HOSE LOW PRESSURE
VACUUM HOSE
BRAKE HOSE HIGHT PRESSURE
VACUUM PIPE
BRAKE PIPE

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

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In-Frame Diesel Fuel Fill

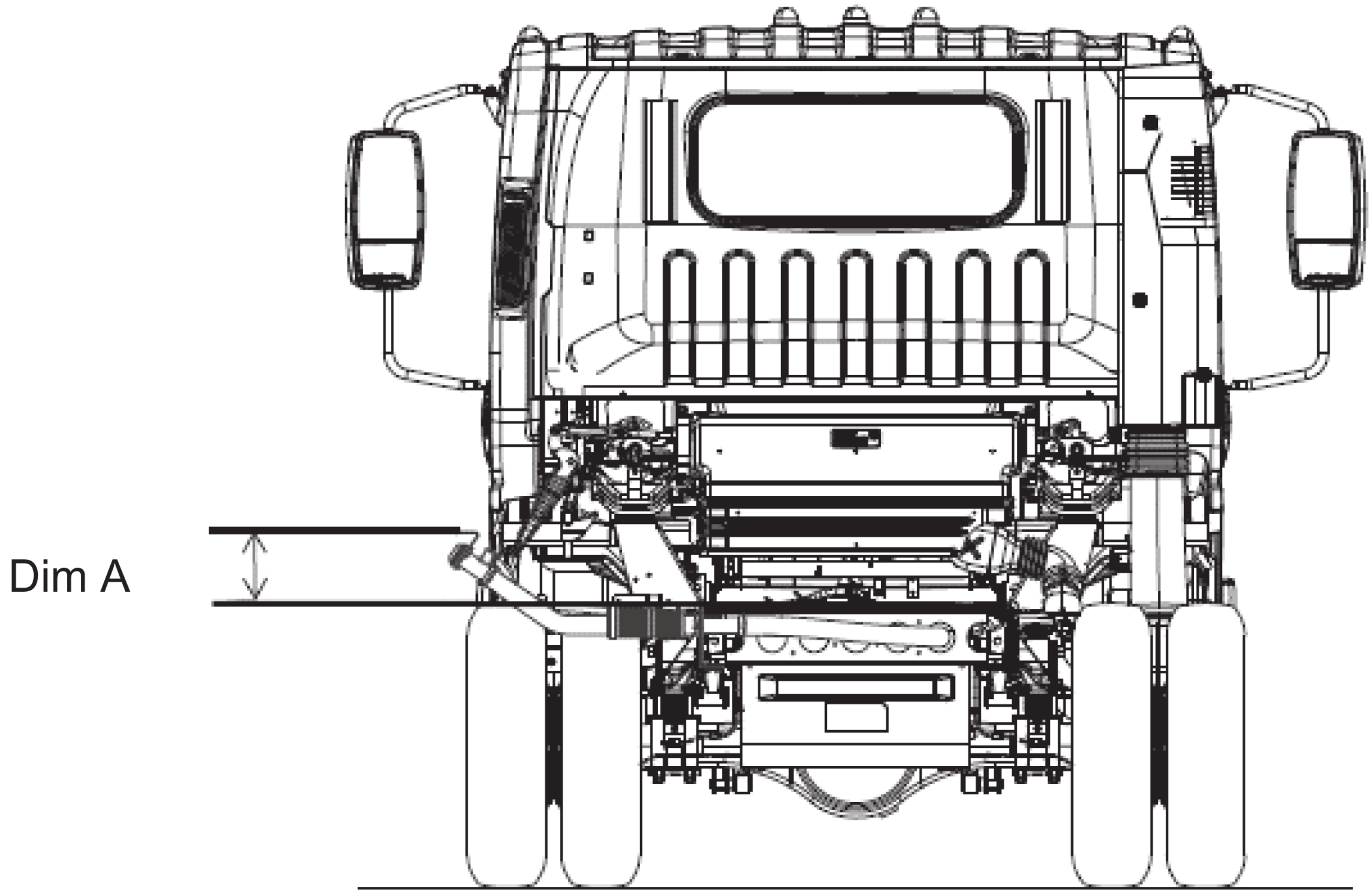
Installation Instructions

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Rear View Fuel Fill

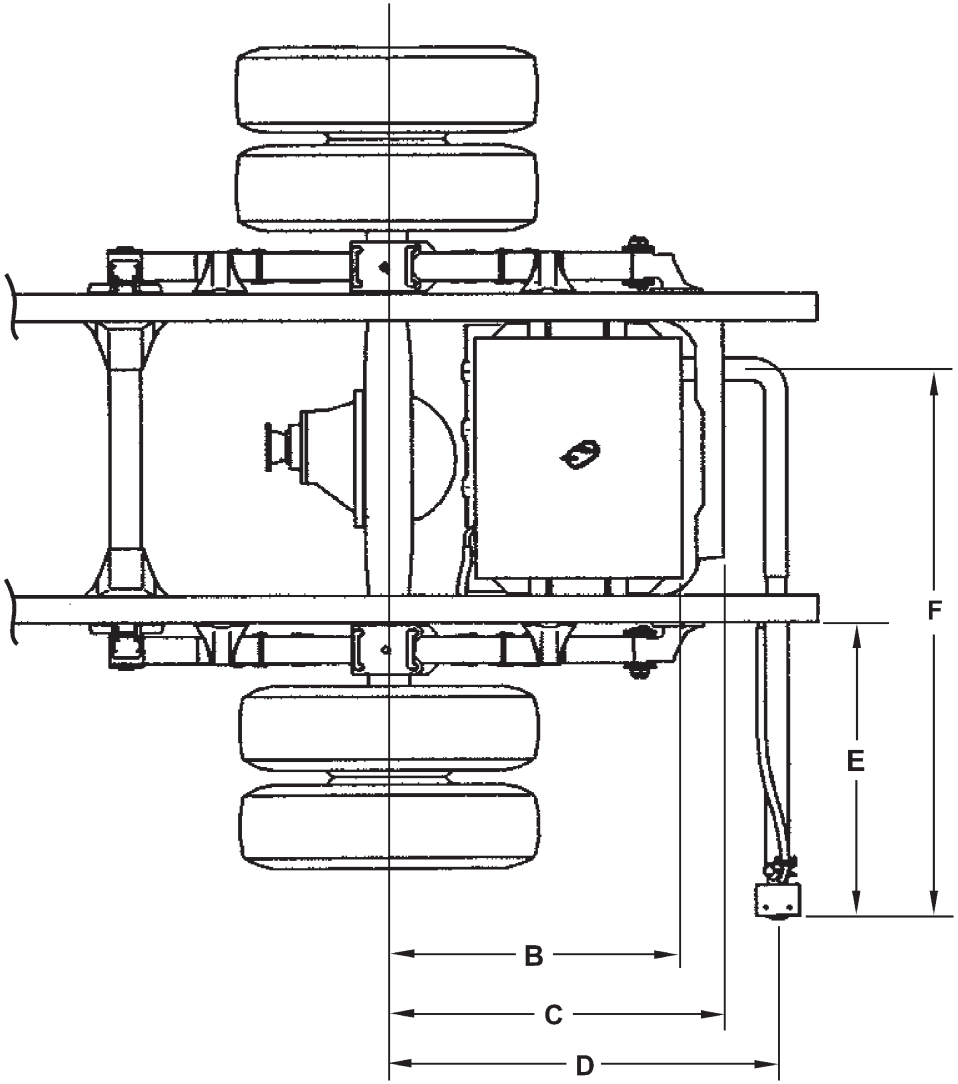


Dimension A = 6.85-8.5 inches (174-216 mm)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Top View Fuel Fill

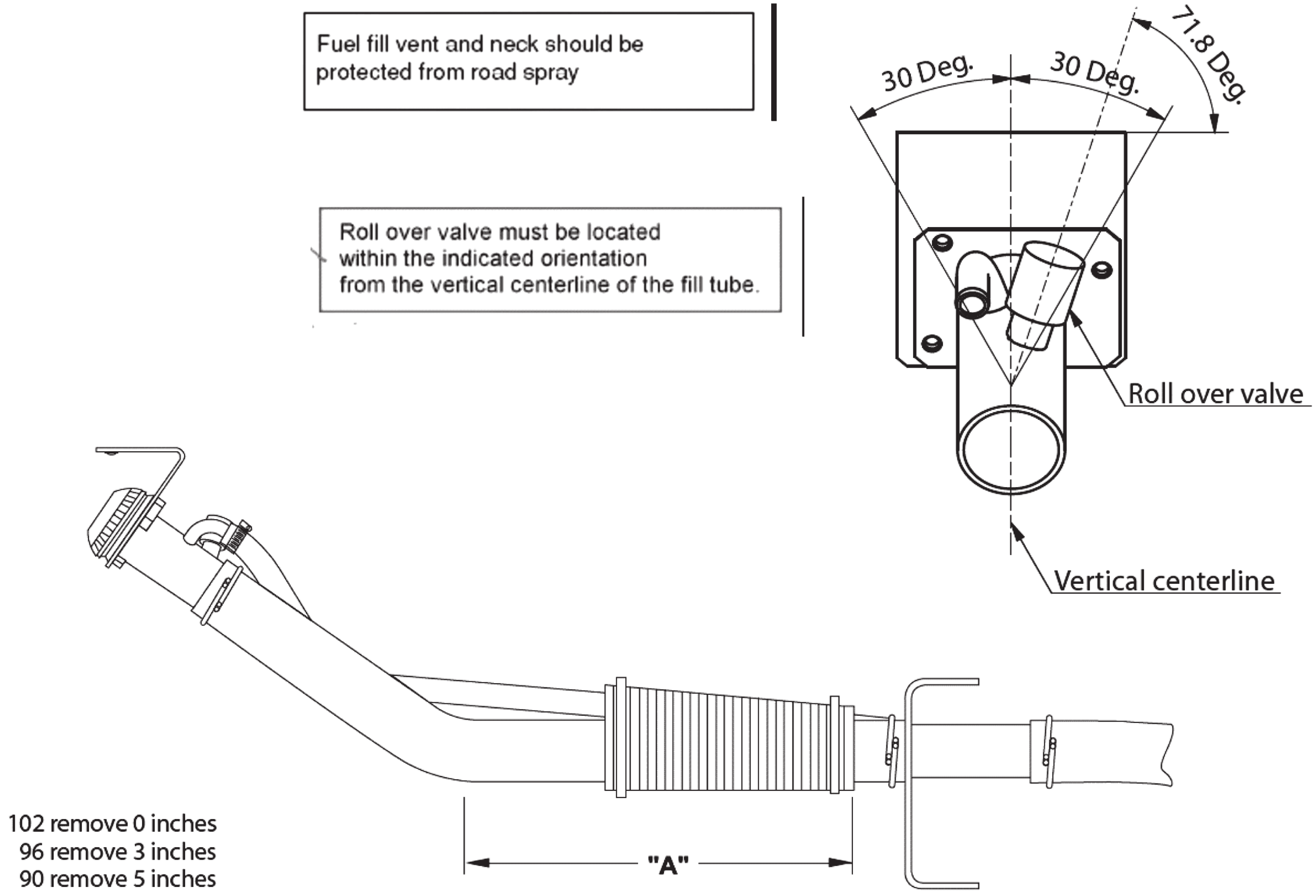


Dimensions:
B = 29.75 inches (756 mm)
C = 34.00 inches (863 mm)
D = 39.29 inches (998 mm)
E = 33.86 inches (860 mm)
F = 59.60 inches (1,514 mm)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Hose Modification for Various Width Bodies



Fuel fill vent and neck should be protected from road spray

Roll over valve must be located within the indicated orientation from the vertical centerline of the fill tube.

30 Deg.
30 Deg.
71.8 Deg.
Roll over valve
Vertical centerline
"A"

102 remove 0 inches
96 remove 3 inches
90 remove 5 inches
86 remove 8 inches
80 remove 8 inches

NOTE: Shorten Hose at "A" Area only.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Ultra Low Sulfur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),
The decal illustrated below must be installed on the vehicle.
The decal is included in the fuel fill parts box.

Ultra Low Sulfur
Diesel Fuel Only

N' utiliser que
du carburant
diesel a teneur
ultra-faible
en soufre

INSTRUCTIONS FOR DECAL PLACEMENT:

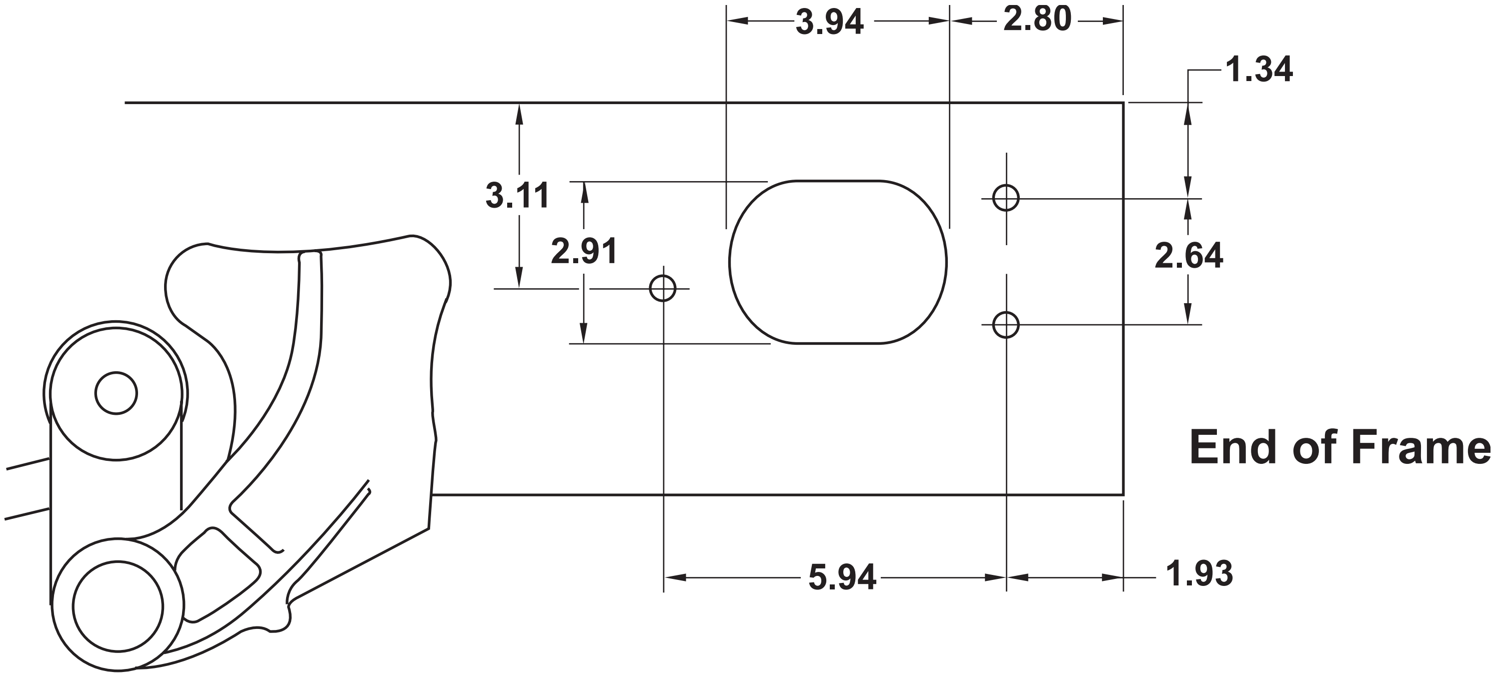
1. The decal must be placed as close as possible to the fuel inlet and be **clearly visible.**
2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
4. For installed bodies that have a fuel door , the decal should be placed above or to the side of the fuel door.

Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

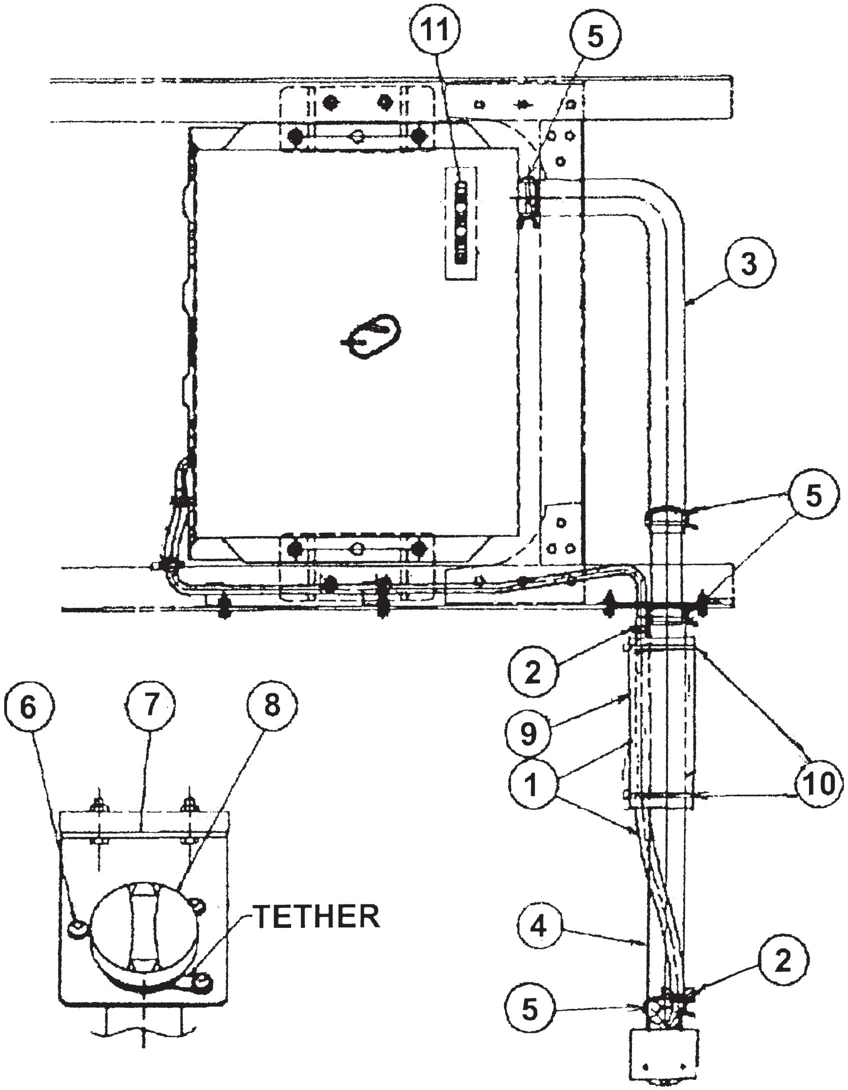
Through the Rail Fuel Fill Frame Hole


3.94
2.80
1.34
3.11
2.91
2.64
End of Frame
5.94
1.93

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Fuel Fill Parts Illustration



(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Diesel – continued from previous page)

Fuel Fill Parts List

Number	Part Name	Isuzu Part Number	GM Part Number	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1070	94062296	2
11	Caution Plate	N/A	15798339	1

NQR/W5500 Diesel

Specifications

Model	NQR/W5500
GVWR	17,950 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.
Model/Displacement	4HK1-TC/317CID (5.19 liters)
HP (Gross)	205 HP @ 2,400 RPM
Torque (Gross)	387 lbs.-ft. torque @ 1,500 RPM
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 in.^{2} radiator; 7-blade 20.1 in. diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light.. Engine warning system with audible warning for low oil pressure, high coolant temperature and low coolant level. Engine cruise control and idle up function. Rear engine cover.
Transmission	Aisin 465 6-speed overdrive automatic transmission with lock-up capability in 2nd through 6th. PTO capability all chassis and wheelbases.
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.
Front Axle	Reverse Elliot “I”-Beam rated at 6,830 lbs.
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.
GAWR	6,830 lbs.
Rear Axle	Full-floating, single speed with hypoid gearing rated at 14,550 lbs.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	12,980 lbs.
Wheels	19.5 x 6.0 6-hole disc wheels, painted white.
Tires	225/70R 19.5F (12 pr) tubeless steel-belted radials, all season tread front and rear.
Brakes	Dual-circuit, power-assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjst outboard mounted drum rear. The parking brake is a mechanical, cable-actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum-operated. Four channel antilock brake system.
Fuel Tank	30-gallon rectangular steel fuel tank mounted in frame rail behind rear axle. Heated fuel/water separator mounted on rail with dash mounted indicator light.

NOTE: These selected specifications are subject to change without notice.

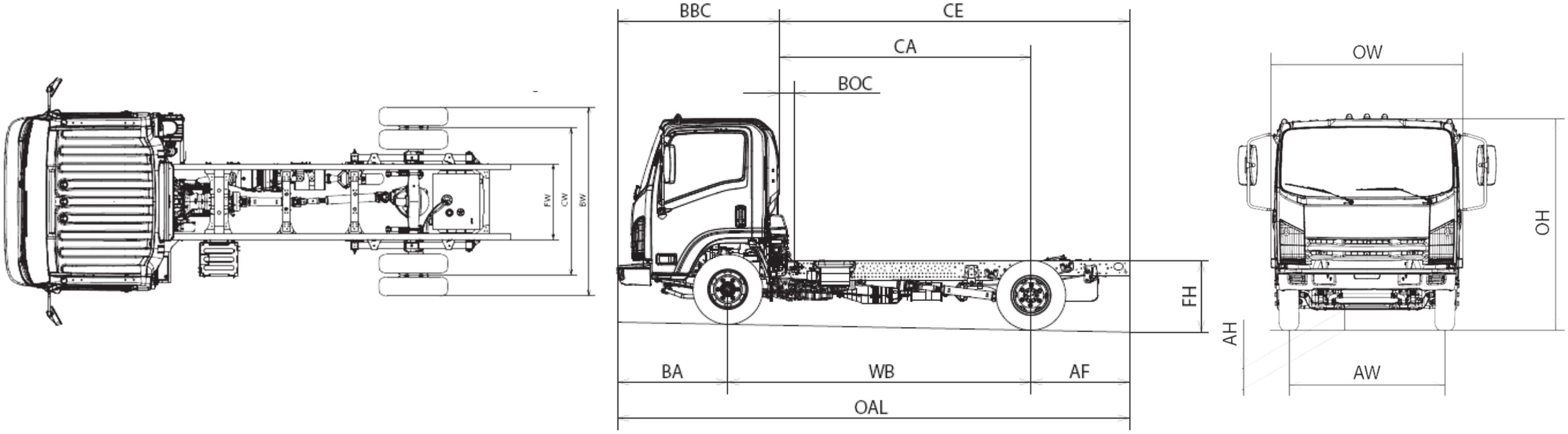
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Model	NQR/W5500
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in.^{3}, RBM 316,800 lbs.-ft./in. per rail.
Cab	All-steel, low cab forward, BBC 70.9 in., 45° mechanical tilt with torsion assist.
Equipment	TRICOT breatheable cloth covered high back driver's seat with two-occupant passenger seat. Dual cab mounted exterior mirrors with integral covex mirror. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.
Electrical	12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110-amp alternator with integral regulator.
Options	AM/FM CD stereo radio, PTO, engine block heater, engine oil pan heater, spare wheel, 6' stainless steel convex mirrors. Auxilliary transmission oil cooler, mandatory for 20,950 GCWR. Power windows and door locks. 33-gallon fuel tank mounted on right hand rail, in place of 30-gallon in frame tank, wheel simulators, engine shutdown system, engine shutdown system with hourmeter. Air conditioning, PTO enable switch, back up alarm.

NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings



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(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Variable Chassis Dimensions

Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

* Effective CA & CE are CA or CE less BOC.

Dimension Constants

Code	Inches	Code	Inches	Code	Inches
AH	8.6	BW	83.3	FH	32.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	91.1		
BOC	6.50	OW	78.5		

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NR1	109.0 in.	lb.	3,936	2,317	6,253	11,697
NR2	132.5 in.	lb.	4,063	2,266	6,329	11,621
NR3	150.0 in.	lb.	4,129	2,236	6,365	11,585
NR4	176.0 in.	lb.	4,214	2,206	6,420	11,530

Side-Mounted Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NR1	109.0 in.	lb.	4,167	2,034	6,201	11,749
NR2	132.5 in.	lb.	4,249	2,028	6,277	11,673
NR3	150.0 in.	lb.	4,301	2,027	6,326	11,622
NR4	176.0 in.	lb.	4,362	2,027	6,389	11,561

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Vehicle Weight Limits:

GVWR

Designed Maximum	17,950 lbs.
GAWR, Front	6,830 lbs.
GAWR, Rear	12,980 lbs.

Technical Notes:

Chassis Curb Weight reflects standard equipment and fuel but no driver or payload.

Maximum Payload Weight is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

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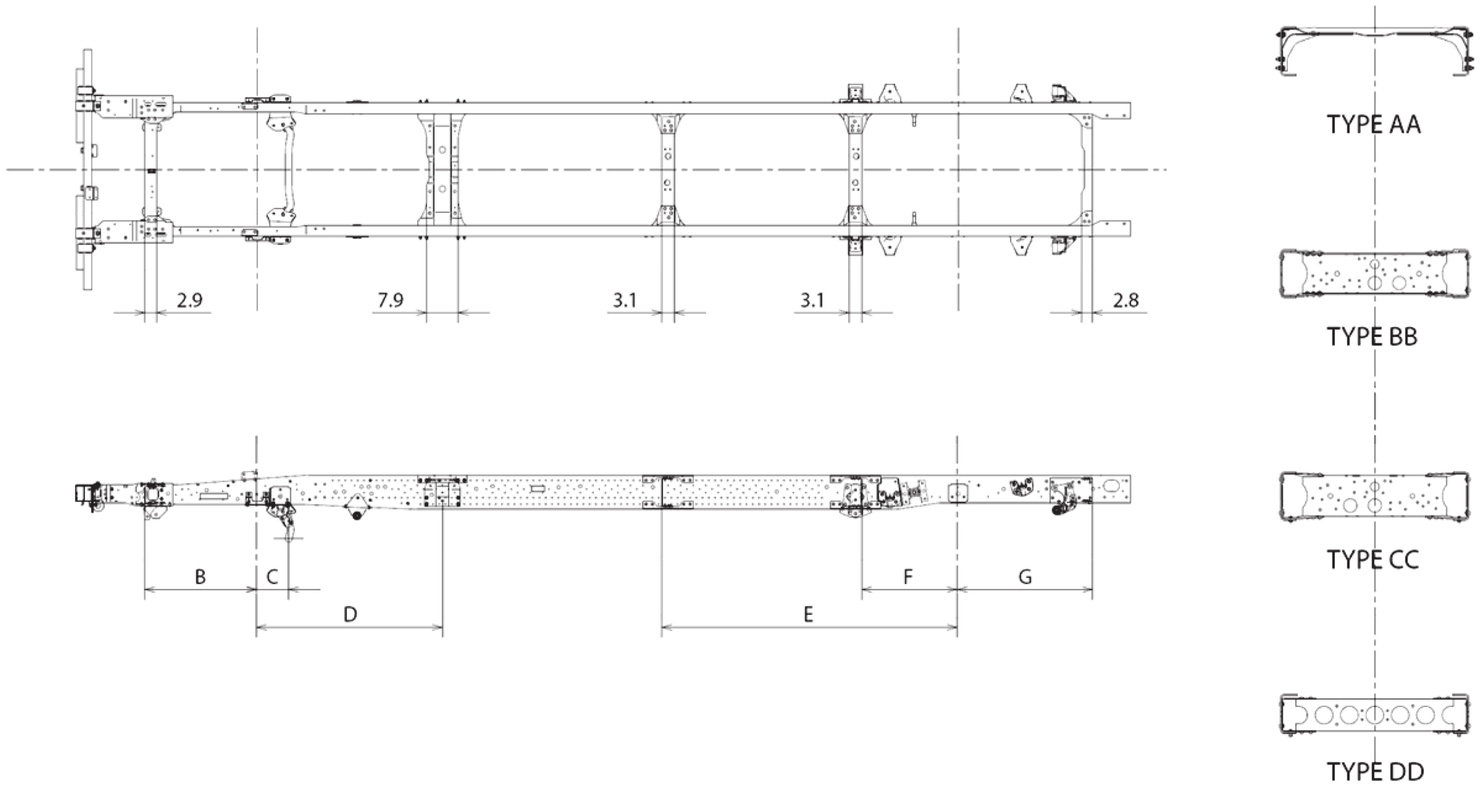
Frame and Crossmember Specifications



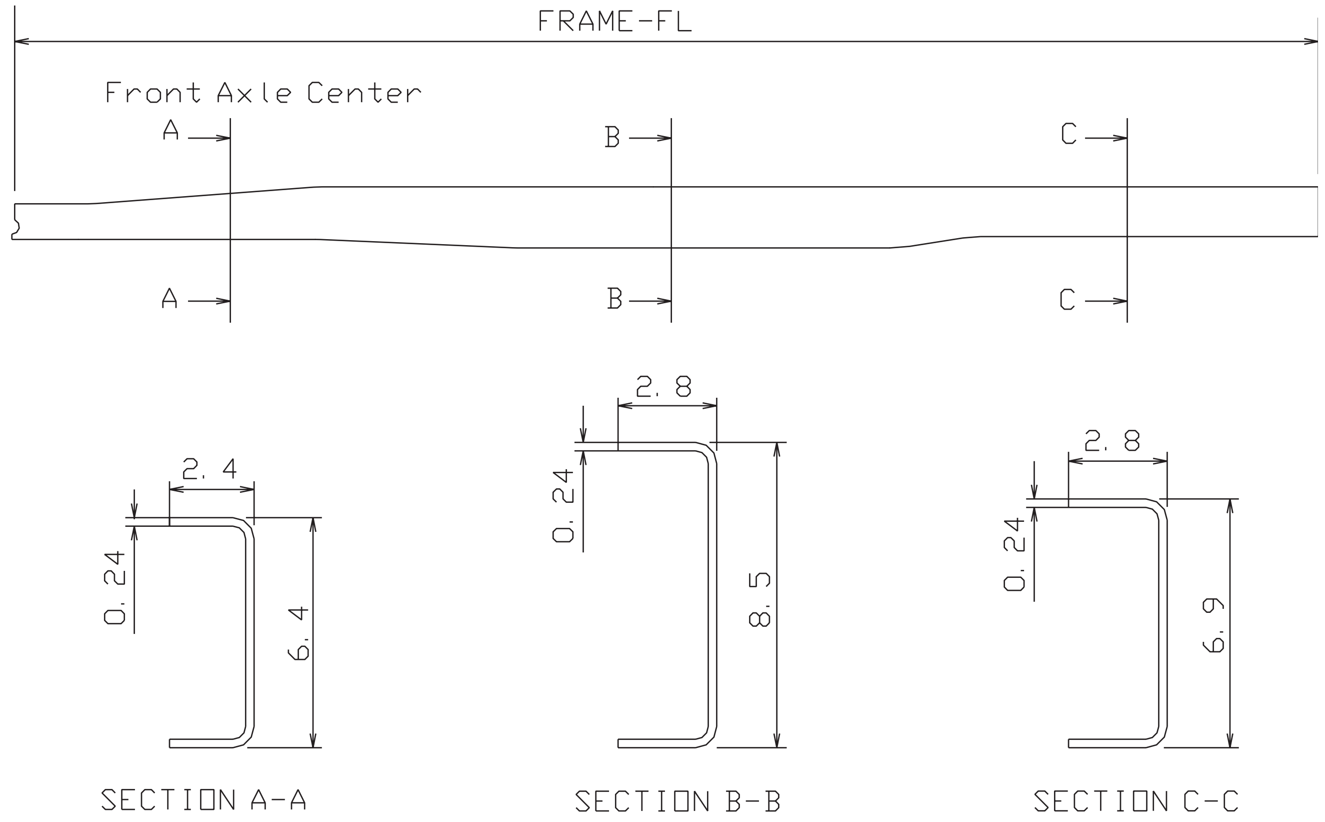
Wheelbase	Frame Thickness	Crossmember Type/Location									
		B	C	D		E		F		G	
109	0.24	28.3	7.9	AA	46.5	-		CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	CC	24.2	DD	33.8

A/T = Automatic Transmission

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Frame Chart

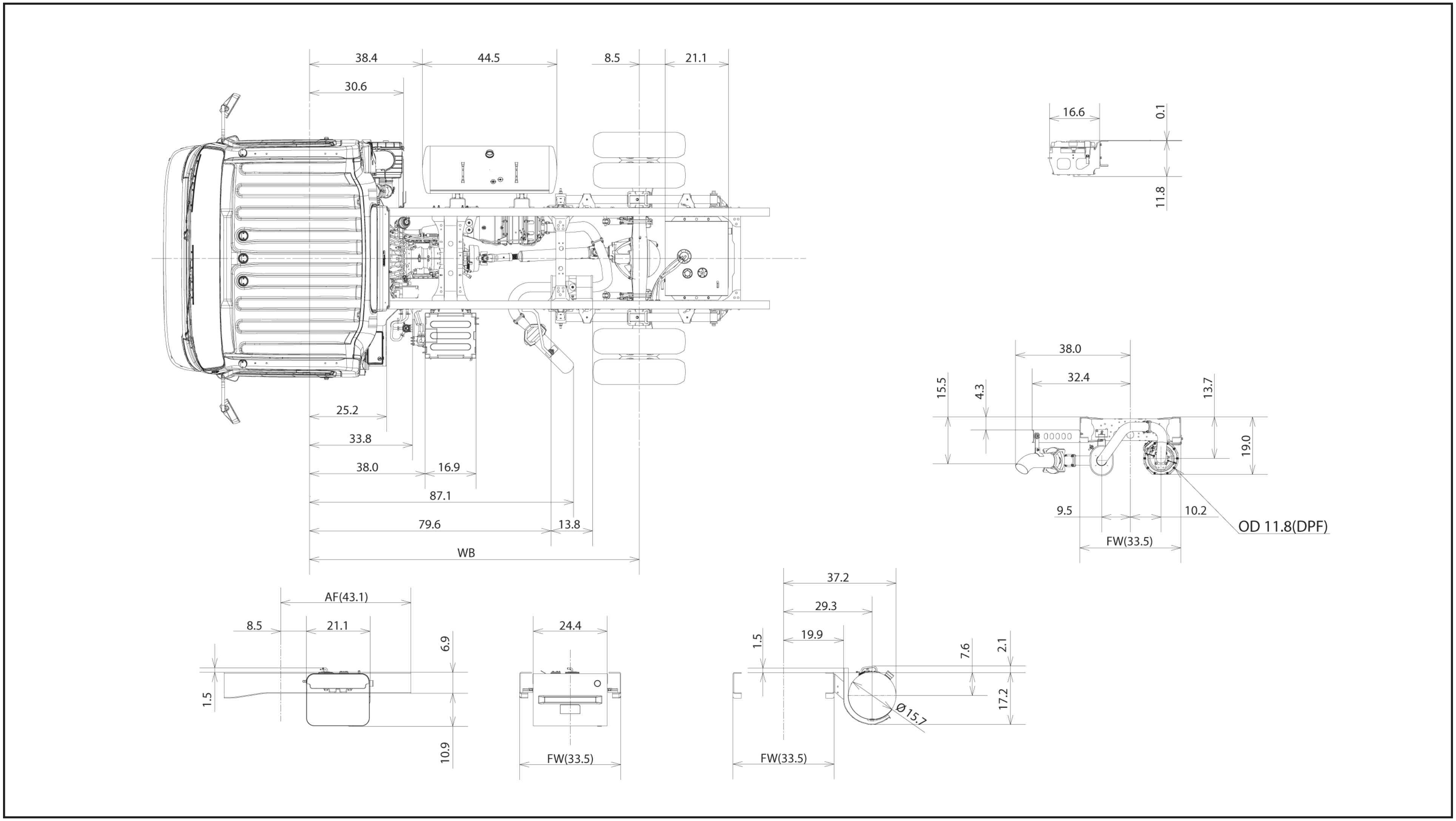

FRAME-FL
Front Axle Center
A
B
C
A
B
C
2.4
0.24
6.4
2.8
0.24
8.5
2.8
0.24
6.9
SECTION A-A
SECTION B-B
SECTION C-C

Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Auxiliary Views 109" Wheelbase

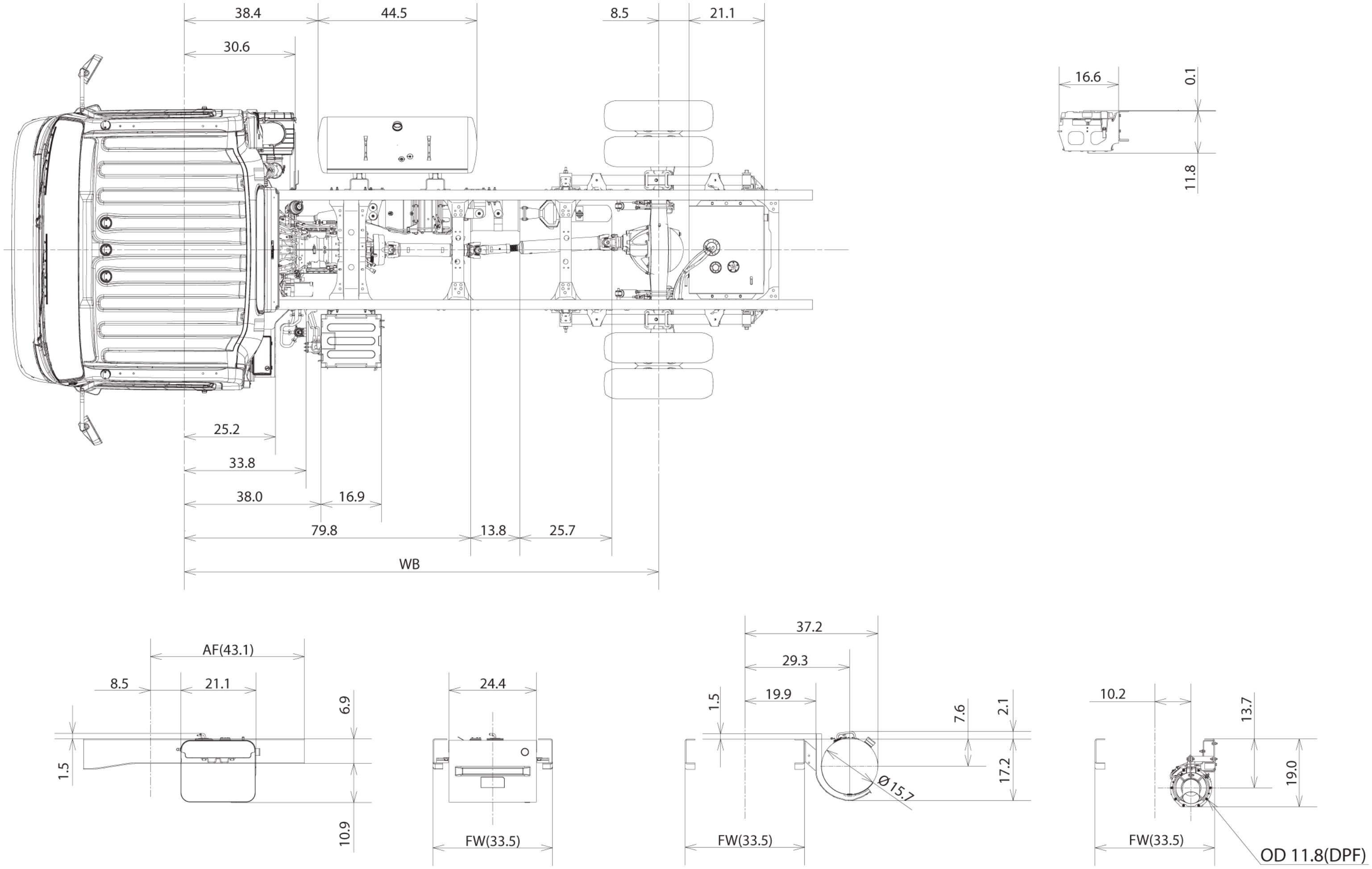

38.4
44.5
8.5
21.1
30.6
25.2
33.8
38.0
16.9
87.1
79.6
13.8
WB
16.6
0.1
11.8
38.0
32.4
15.5
4.3
13.7
19.0
9.5
10.2
OD 11.8(DPF)
FW(33.5)
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Auxiliary Views 132.5" Wheelbase

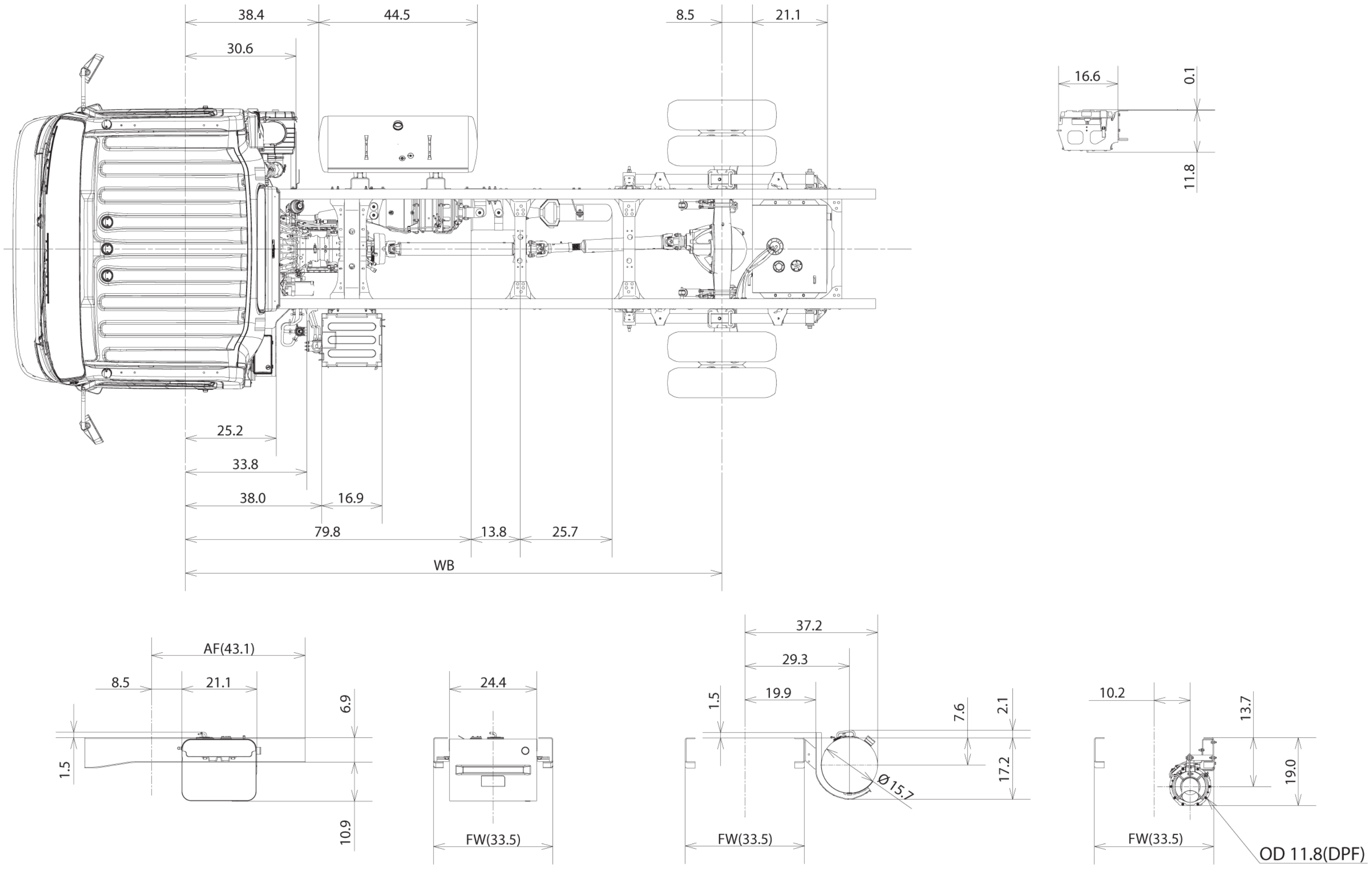

38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Auxiliary Views 150" Wheelbase

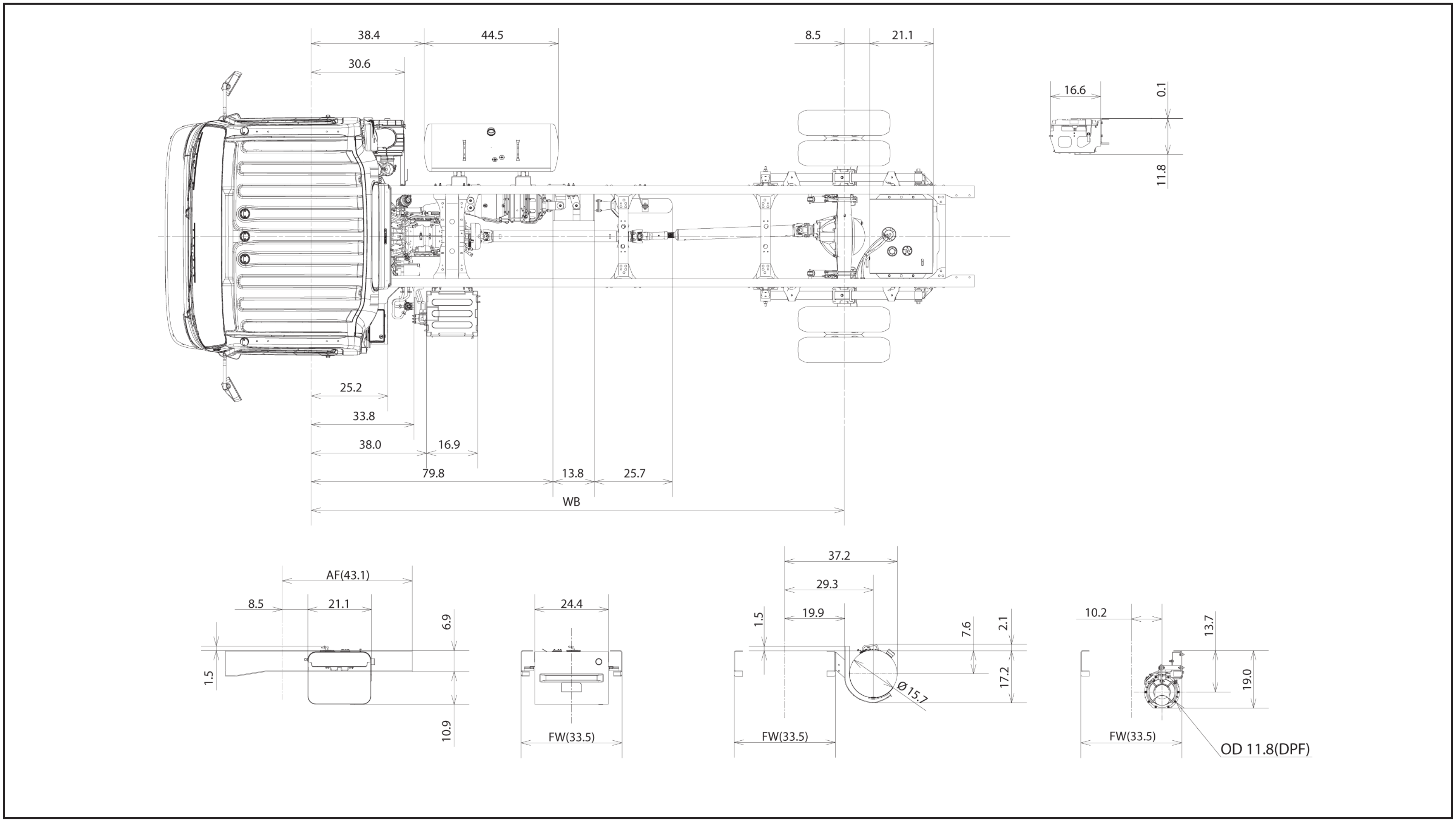

38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Auxiliary Views 176" Wheelbase


38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

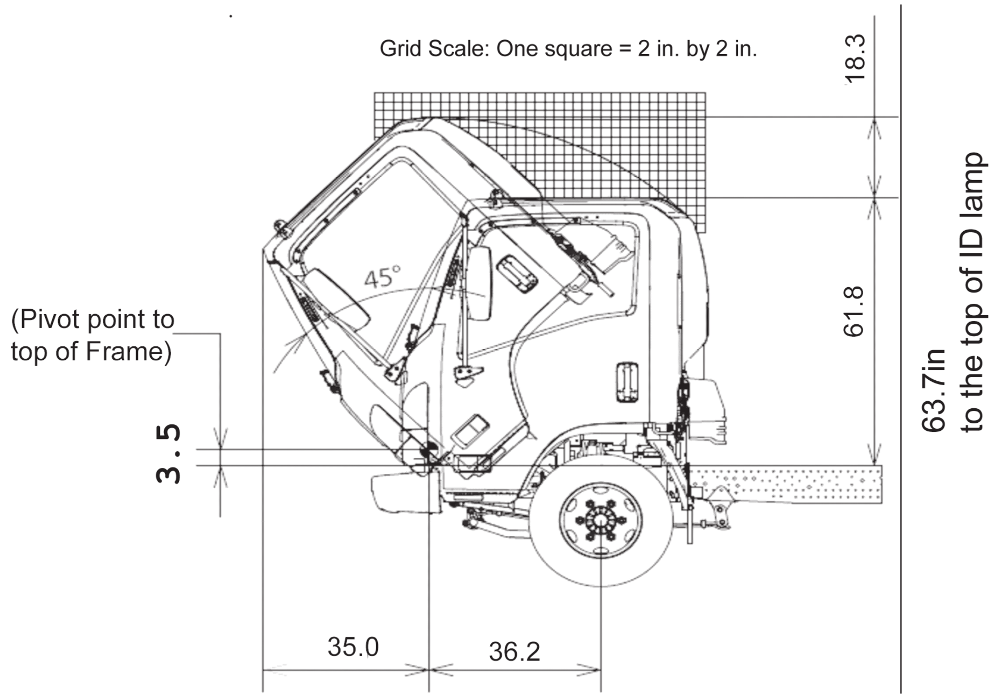
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Body Builder Weight Information Chart

GVWR	Axle	Wheelbase								Unsprung Weight
		109 in.		132.5 in.		150 in.		176 in.		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
17,950	Front	3,936	4,167	4,063	4,249	4,129	4,301	4,214	4,362	661
	Rear	2,317	2,034	2,266	2,028	2,236	2,027	2,206	2,027	1,190
	Total	6,253	6,201	6,329	6,277	6,365	6,328	6,420	6,389	1,851

Cab Tilt


Grid Scale: One square = 2 in. by 2 in.
18.3
45°
61.8
63.7in
to the top of ID lamp
(Pivot point to
top of Frame)
3.5
35.0
36.2

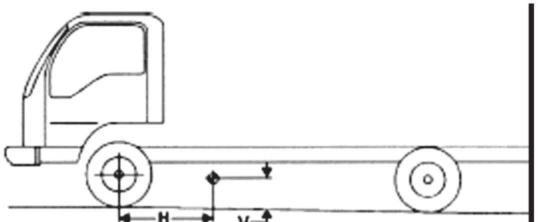
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
17,950	109	25.0	40.4	35.8
	132.5	24.9	47.4	42.8
	150	24.9	52.7	48.1
	176	24.8	60.5	55.9



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

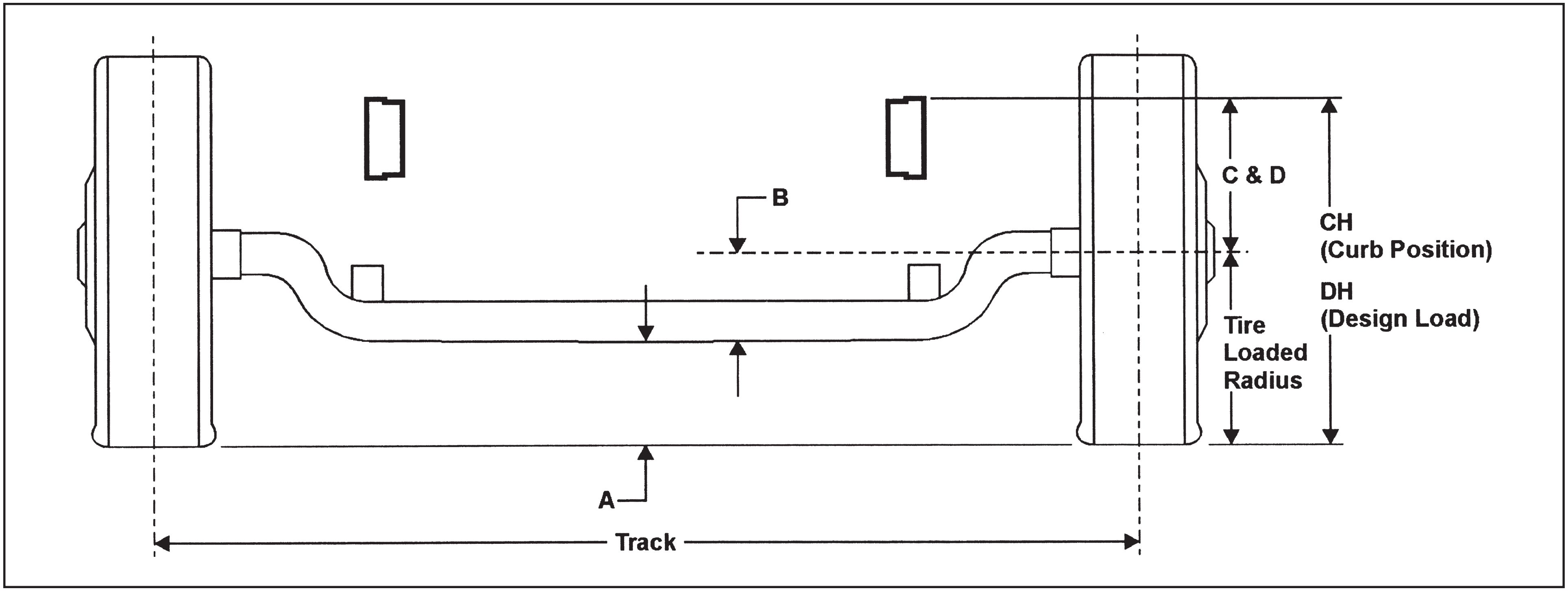
The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 17,950 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NQR/W5500 are 102 inches wide (outside) by 90inches high (inside). Any larger body applications must be approved by GM/Isuzu Application Engineering. In th West Coast call 1-562-229-5314 and in the East Coast call 1-404-257-3013

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Front Axle Chart



Formulas for calculating height dimensions:

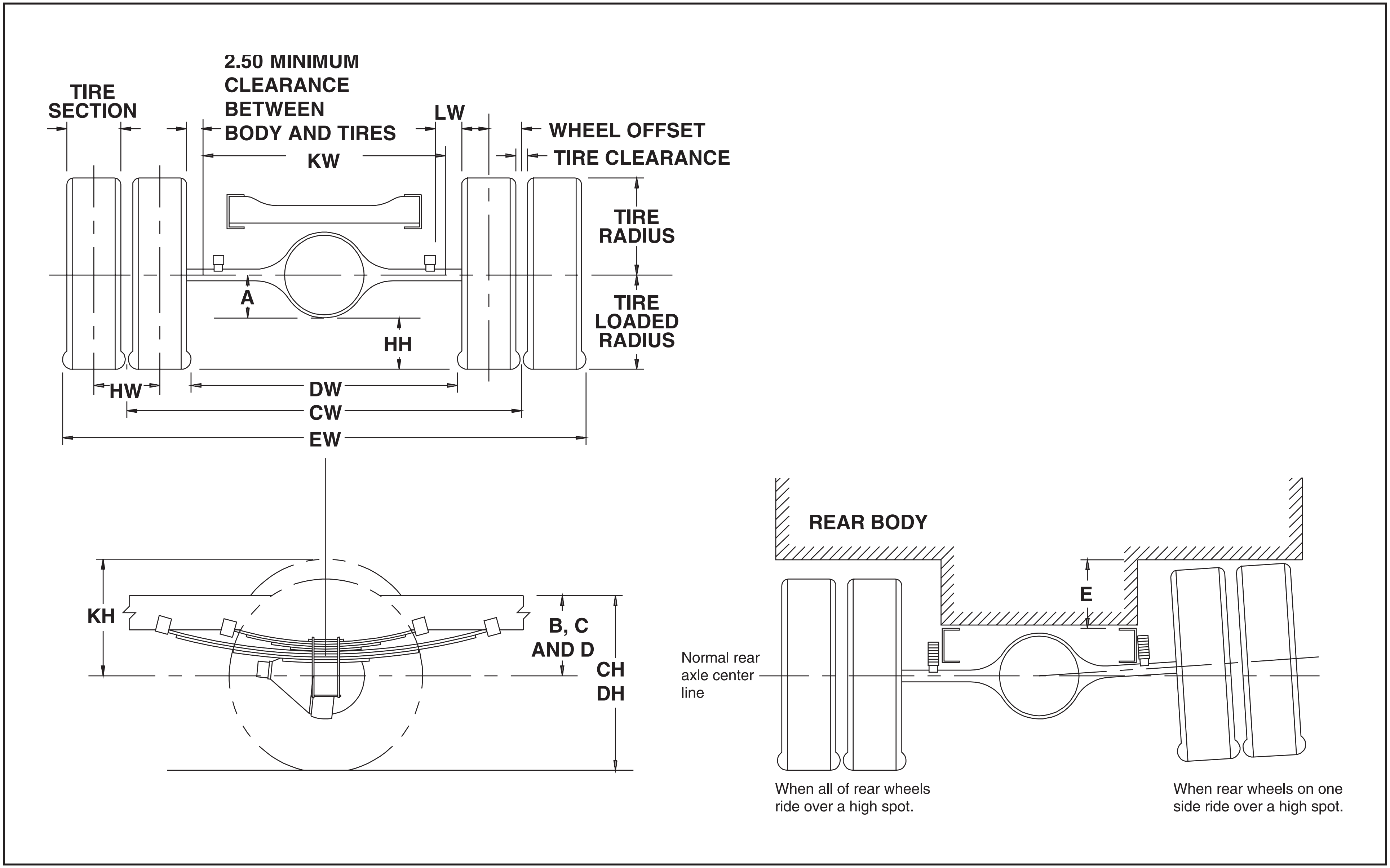
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	17,950 lbs.	6,830 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Rear Axle Chart


2.50 MINIMUM CLEARANCE BETWEEN BODY AND TIRES
TIRE SECTION
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE RADIUS
TIRE LOADED RADIUS
A
HH
HW
DW
CW
EW
KH
B, C AND D
CH
DH
REAR BODY
E
Normal rear axle center line

When all of rear wheels ride over a high spot.

When rear wheels on one side ride over a high spot.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

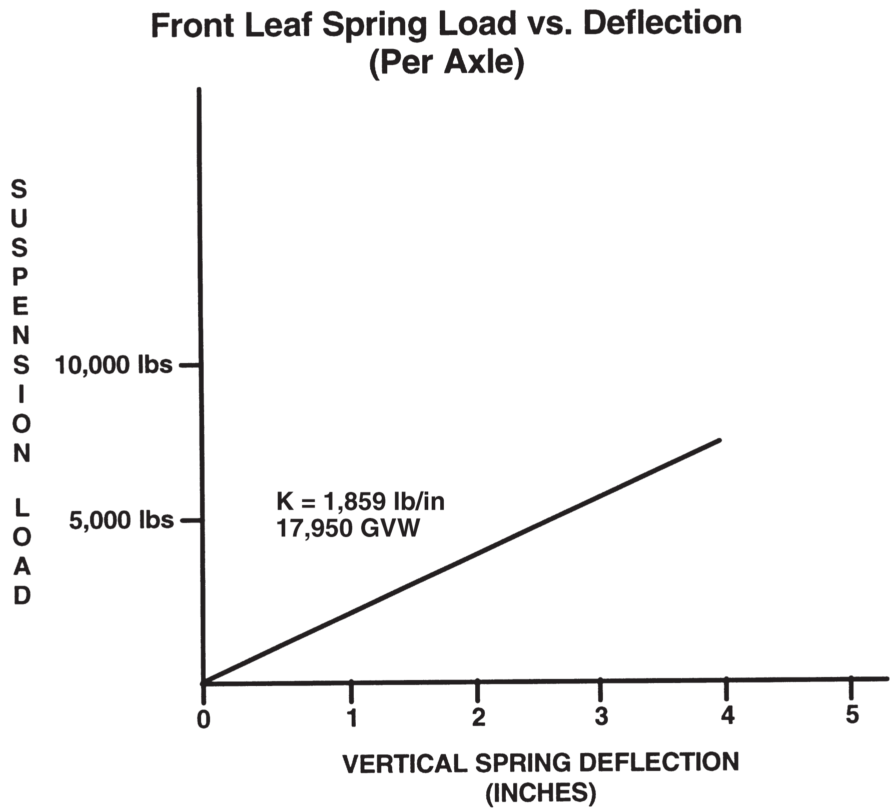
NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	12,980 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.3	13.4	8.4

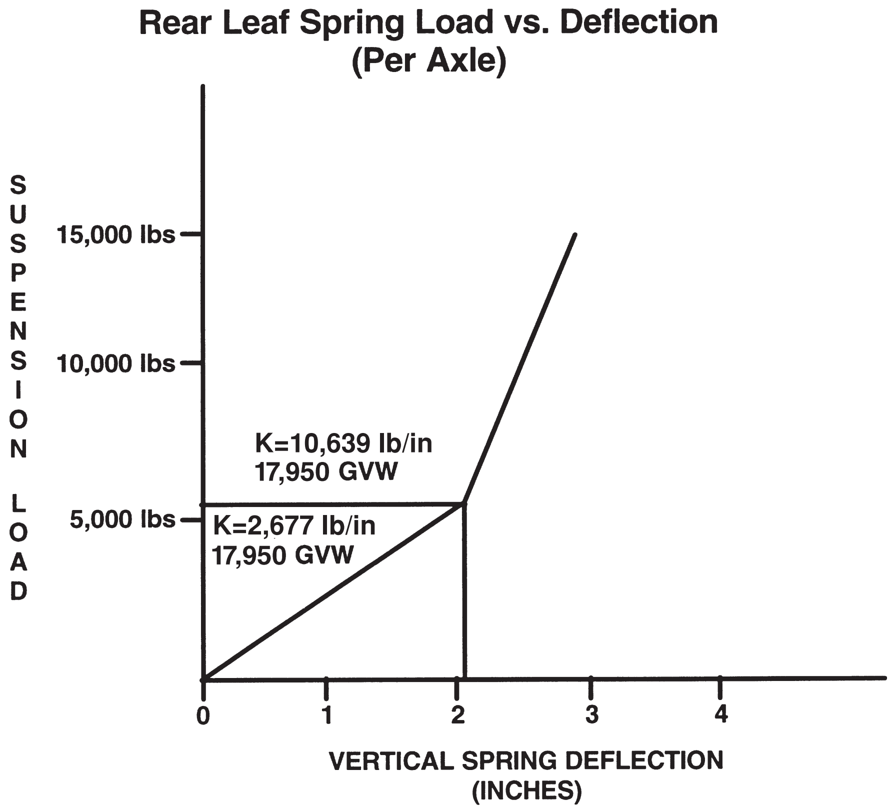
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Suspension Deflection Charts



Front Leaf Spring Load vs. Deflection (Per Axle)



Rear Leaf Spring Load vs. Deflection (Per Axle)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Tire and Disc Wheel Chart

Tire

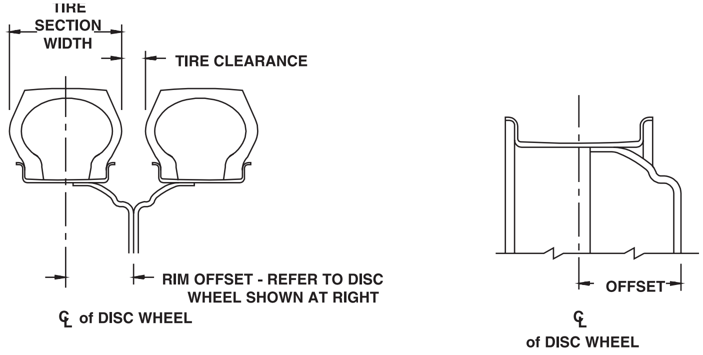
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	6,900	12,980	17,950

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	17,950	14.93	14.98	16.00	16.00	8.7	1.3	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 RW	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	15º DC	Steel TOPY

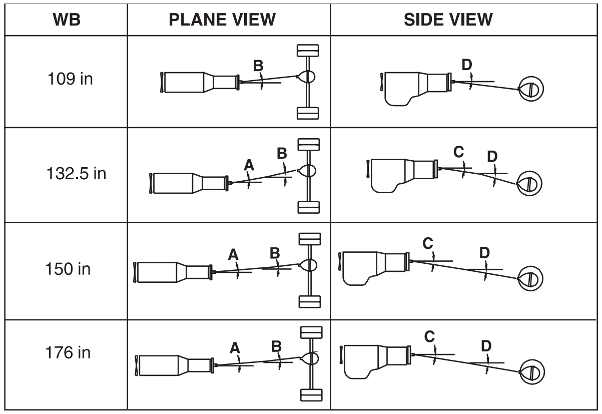
* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

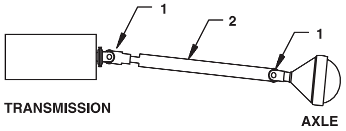
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Propeller Shaft

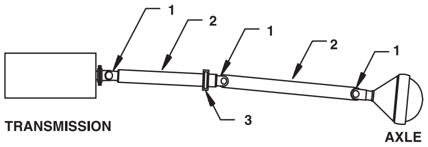

WB
PLANE VIEW
SIDE VIEW
109 in
B
D
132.5 in
A
B
C
D
150 in
A
B
C
D
176 in
A
B
C
D

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(109 in WB)


1
2
1
TRANSMISSION
AXLE

(132.5 in, 150 in and 176 in WB)


1
2
1
2
1
3
TRANSMISSION
AXLE

1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

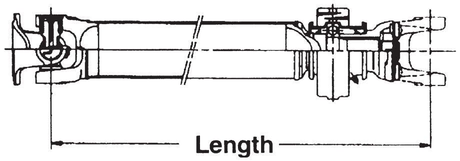
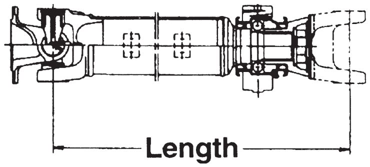
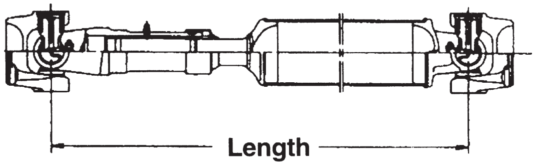
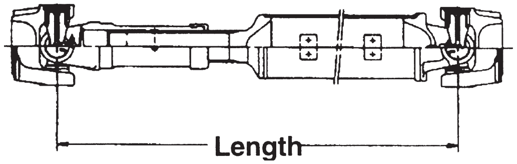
Wheelbase	Plane View		Side View	
	A	B	C	D
	Auto. Trans.	Auto. Trans.	Auto. Trans.	Auto. Trans.
109 in.	—	3.2°	—	8.4°
132.5 in.	0°	3.3°	2.6°	2.7°
150 in.	0°	3.3°	1.8°	1.8°
176 in.	0°	2.2°	0.4°	3.5°

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Wheelbase	109	132.5	150	176
No. of Shafts	1	2	2	2
Trans. Type	6 Auto. Trans.	6 Auto. Trans.	6 Auto. Trans.	6 Auto. Trans.
Shaft #1 O.D.	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126
Length	37.2	24.5	41.8	51.3
Type	B	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126
Length	N/A	36.1	36.4	52.9
Type	N/A	B	B	B

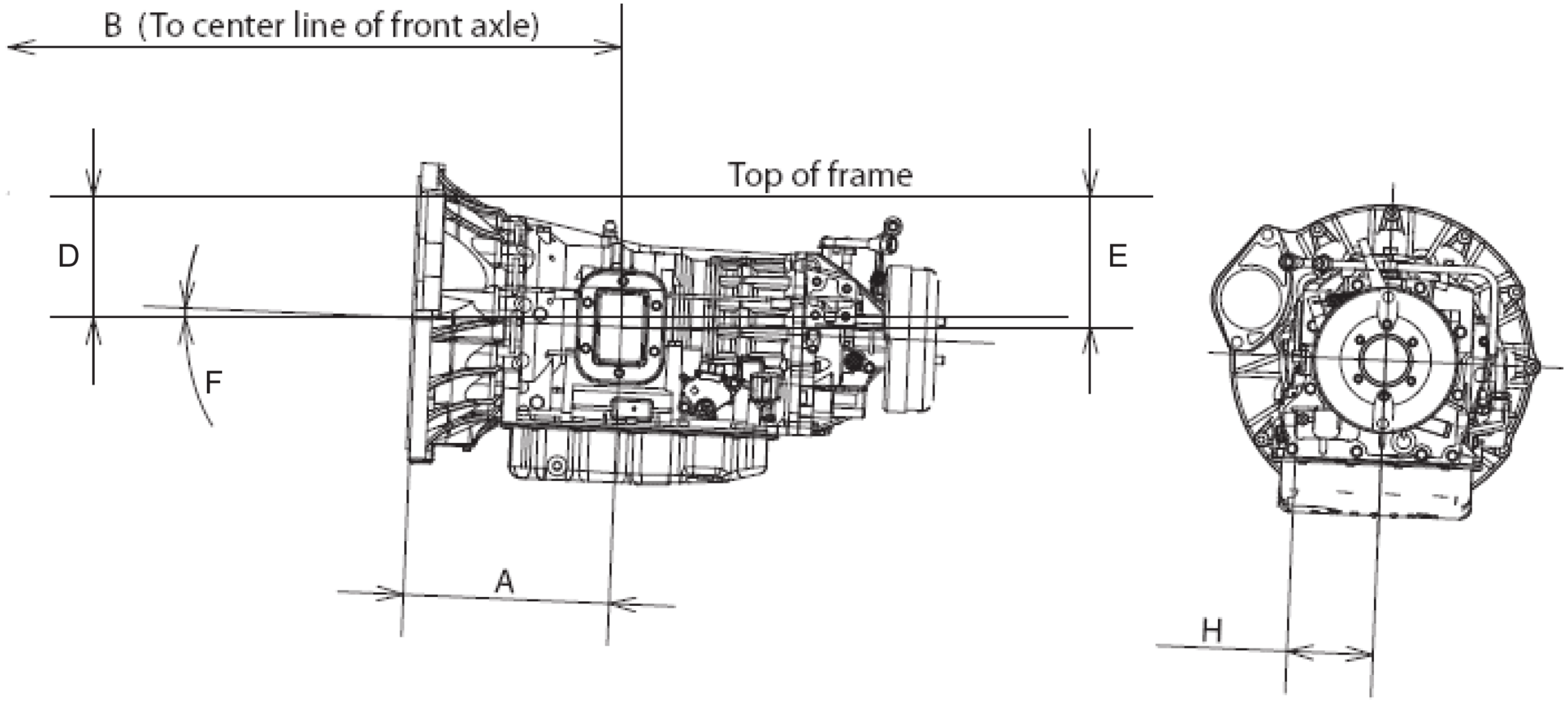
Type	Description	Model	Illustration
Type **A**	1st shaft in 2-piece driveline	P20	
Type **B**		P30	
Type **C**	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	P20	
Type **D**		P30	

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

PTO Location, Drive Gear and Opening Information

AUTOMATIC TRANSMISSION


B (To center line of front axle)
Top of frame
D
E
F
A
H

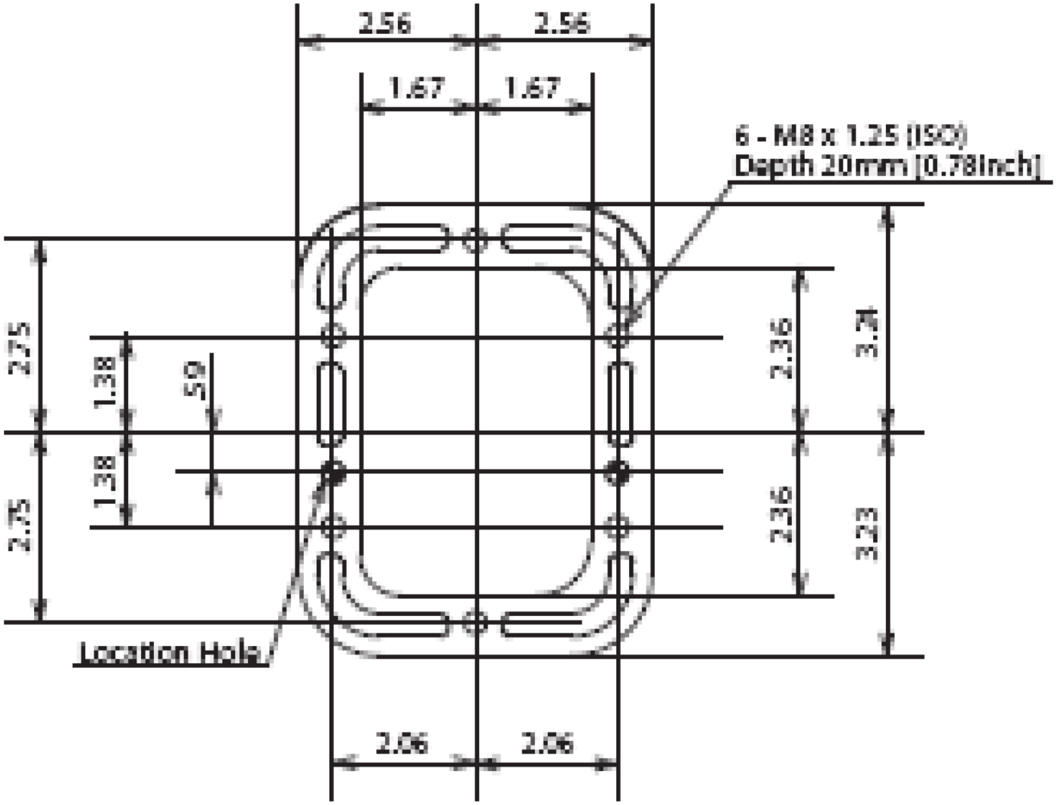
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

2008 GM/Isuzu Truck

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin[1)]	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5°	5.16	PTO Gear	1:1 with turbine	69	N/A	0°	134 lbs.-ft. @ 1,700 RPM

Opening Diagram

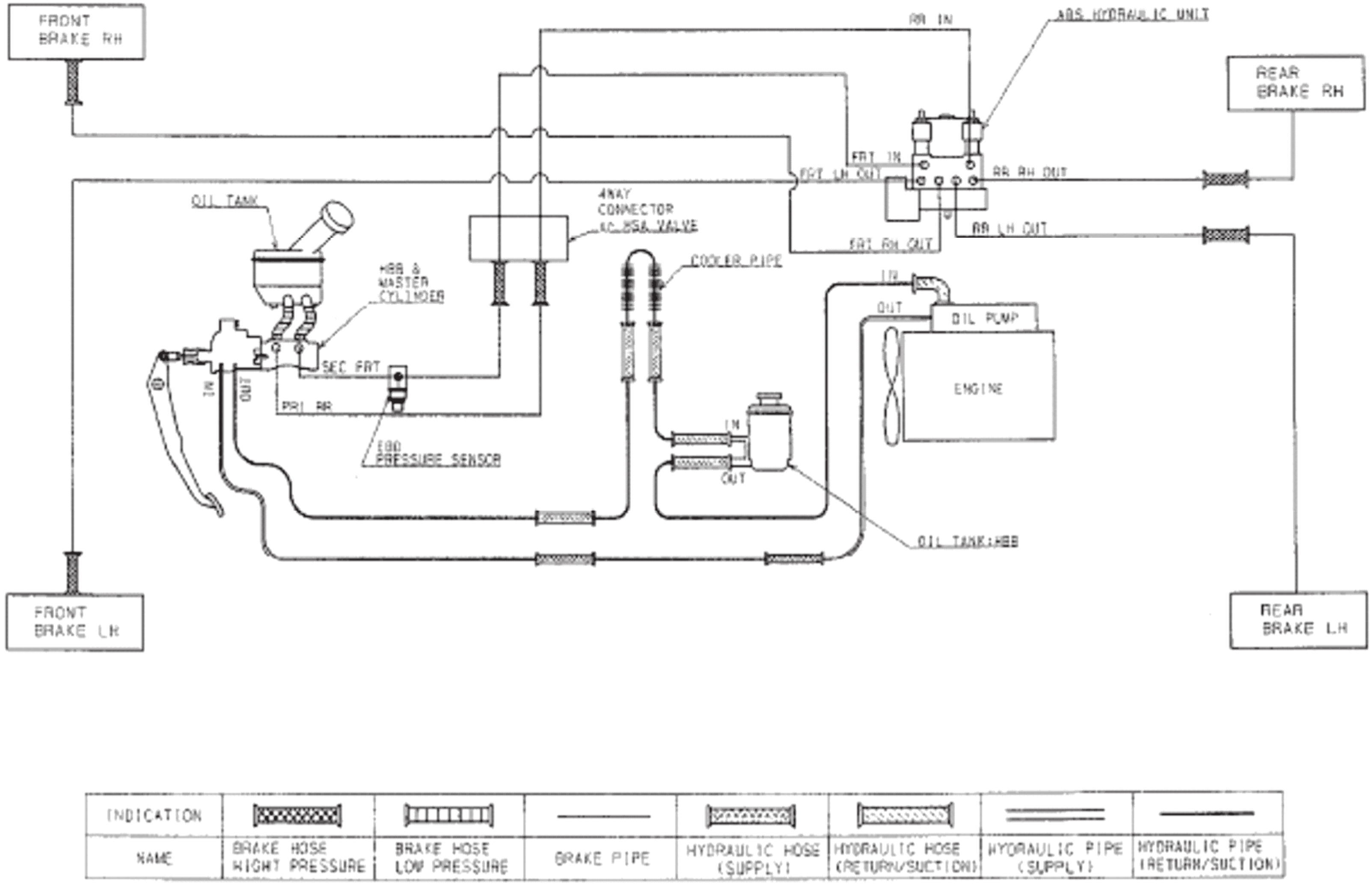

2.56
2.56
1.67
1.67
6 - M8 x 1.25 (ISO)
Depth 20mm [0.78Inch]
2.75
2.75
1.38
1.38
59
2.36
2.36
3.7
3.23
Location Hole
2.06
2.06

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Brake System Diagram, Hydraulic Brake Booster

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
OIL TANK
4WAY CONNECTOR &C HSA VALVE
RR LH OUT
FRT RH OUT
COOLER PIPE
HBB & MASTER CYLINDER
IN
OUT
OIL PUMP
SEC FRT
IN
OUT
PRI RR
ENGINE
IN
EBD PRESSURE SENSOR
OUT
OIL TANK:HBB
FRONT BRAKE LH
REAR BRAKE LH
INDICATION
NAME
BRAKE HOSE HIGHT PRESSURE
BRAKE HOSE LOW PRESSURE
BRAKE PIPE
HYDRAULIC HOSE (SUPPLY)
HYDRAULIC HOSE (RETURN/SUCTION)
HYDRAULIC PIPE (SUPPLY)
HYDRAULIC PIPE (RETURN/SUCTION)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Diesel Fuel Fill

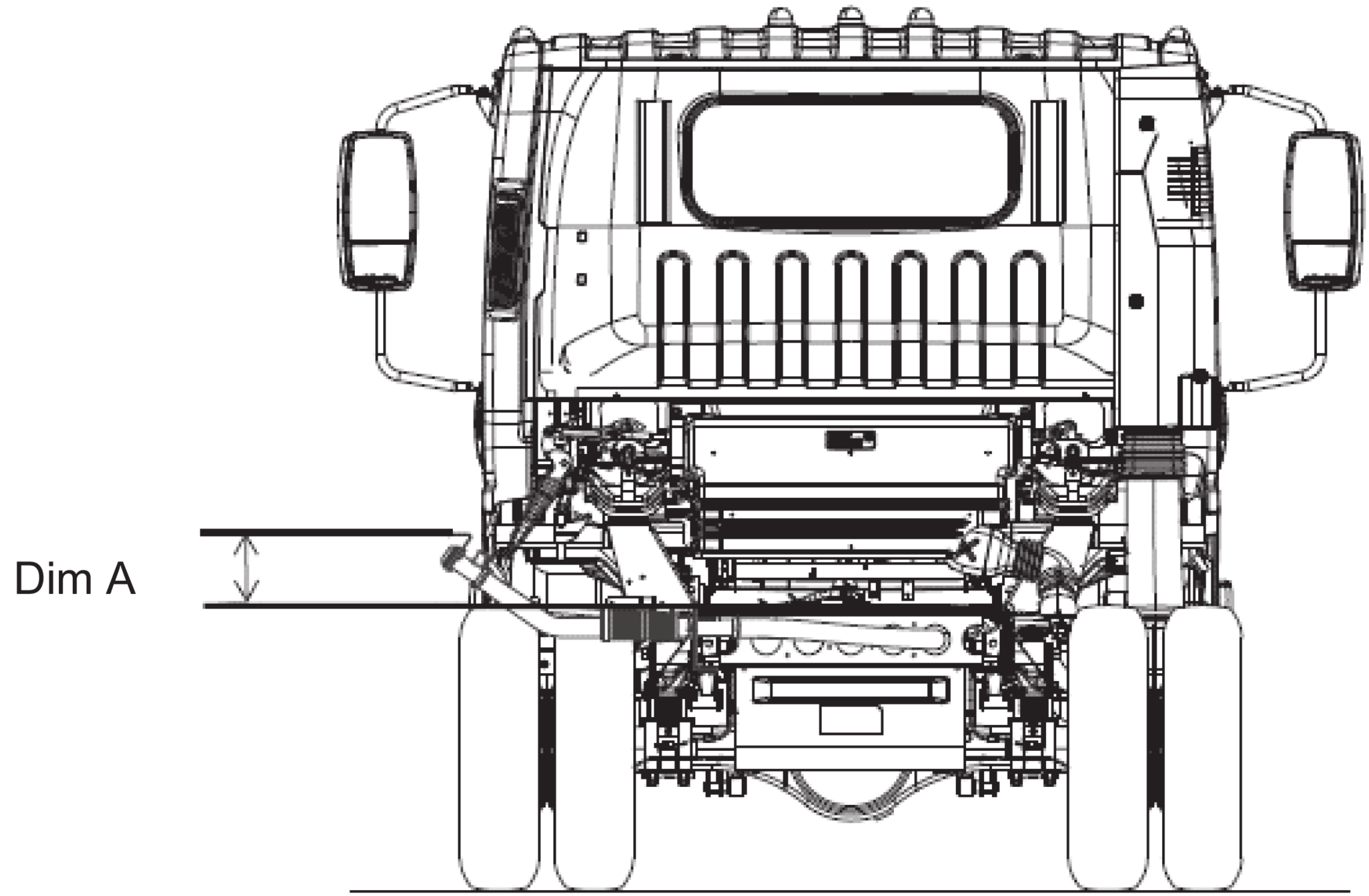
Installation Instructions

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver's side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Rear View Fuel Fill



Dimension A = 6.85-8.5 inches (174-216 mm)

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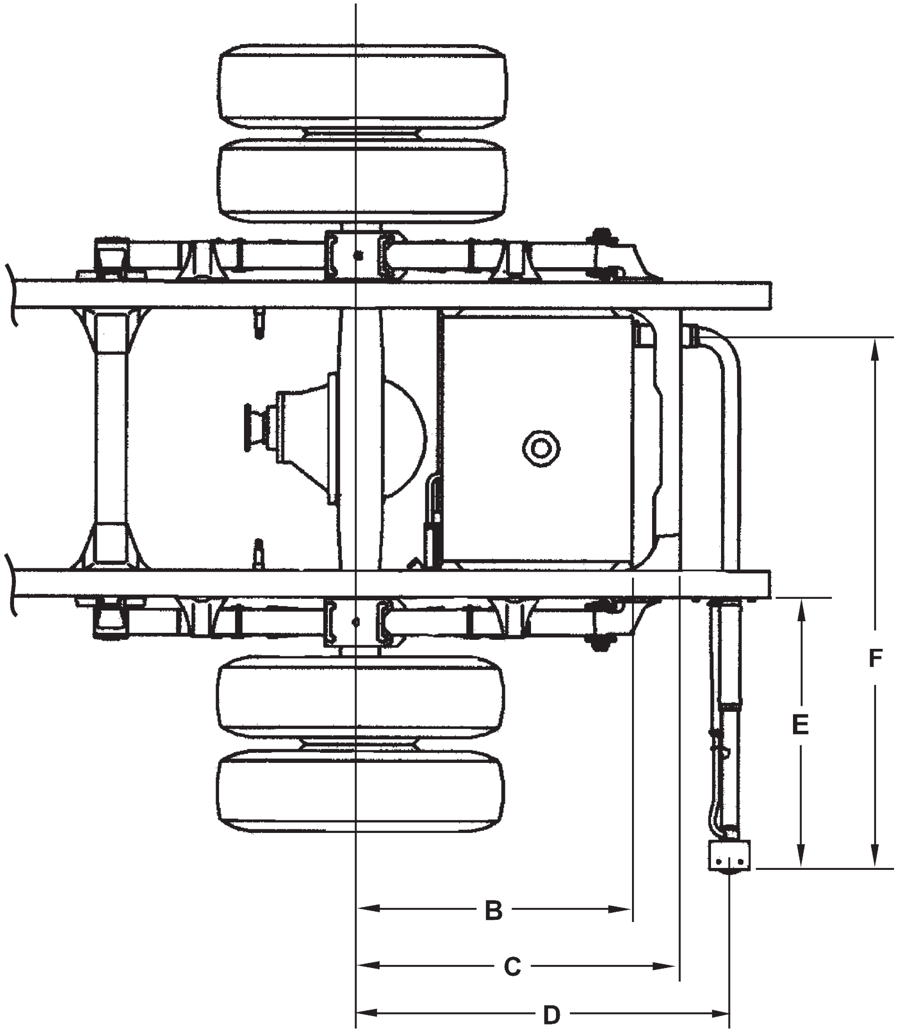
(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Top View Fuel Fill

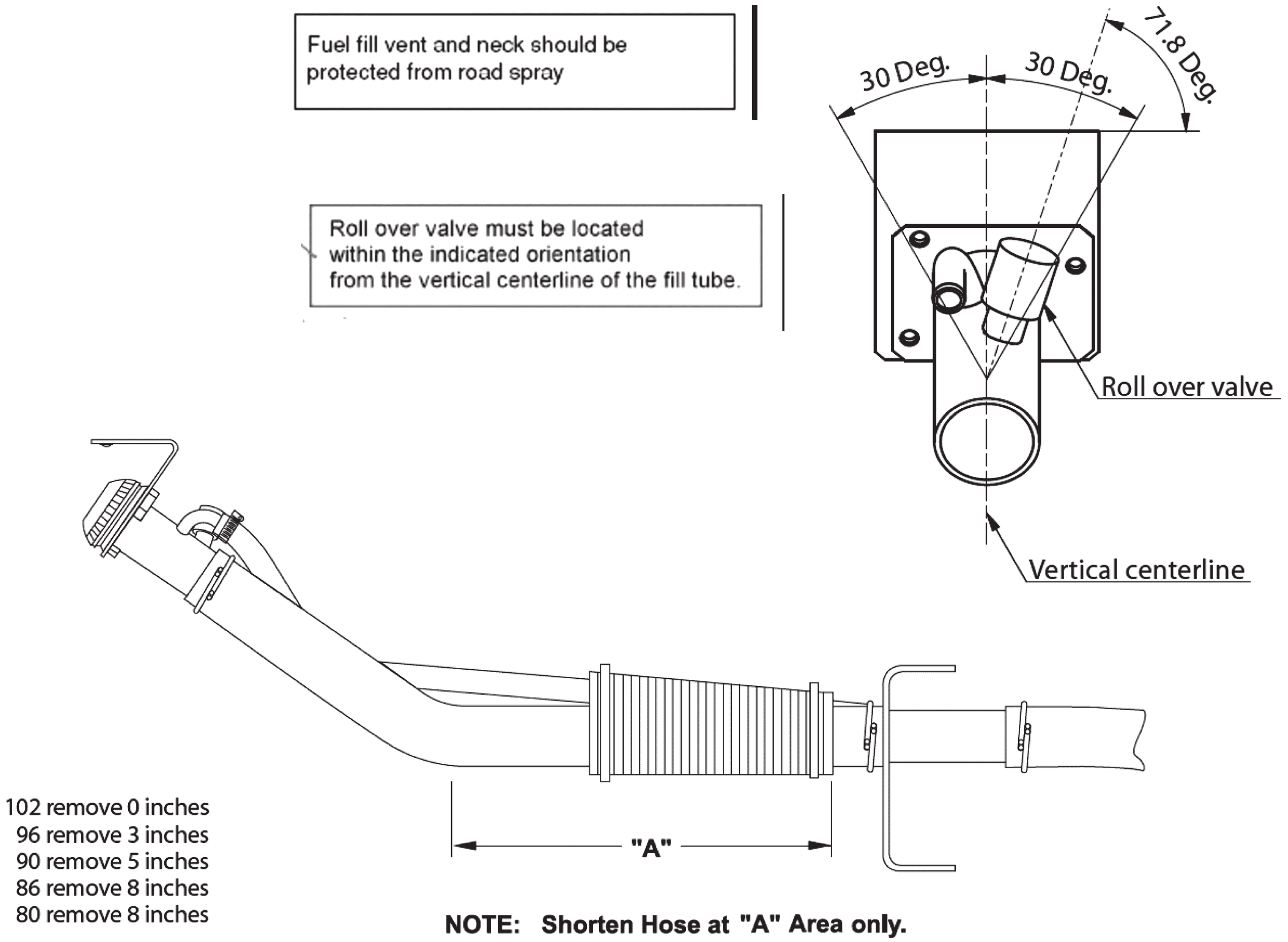


Dimensions:
B = 29.75 inches (756 mm)
C = 34.00 inches (863 mm)
D = 39.29 inches (998 mm)
E = 33.86 inches (860 mm)
F = 59.60 inches (1,514 mm)mm

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



Fuel fill vent and neck should be protected from road spray

Roll over valve must be located within the indicated orientation from the vertical centerline of the fill tube.

102 remove 0 inches
96 remove 3 inches
90 remove 5 inches
86 remove 8 inches
80 remove 8 inches

NOTE: Shorten Hose at "A" Area only.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Ultra Low Sulfur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),
The decal illustrated below must be installed on the vehicle.
The decal is included in the fuel fill parts box.

Ultra Low Sulfur
Diesel Fuel Only

N' utiliser que
du carburant
diesel a teneur
ultra-faible
en soufre

INSTRUCTIONS FOR DECAL PLACEMENT:

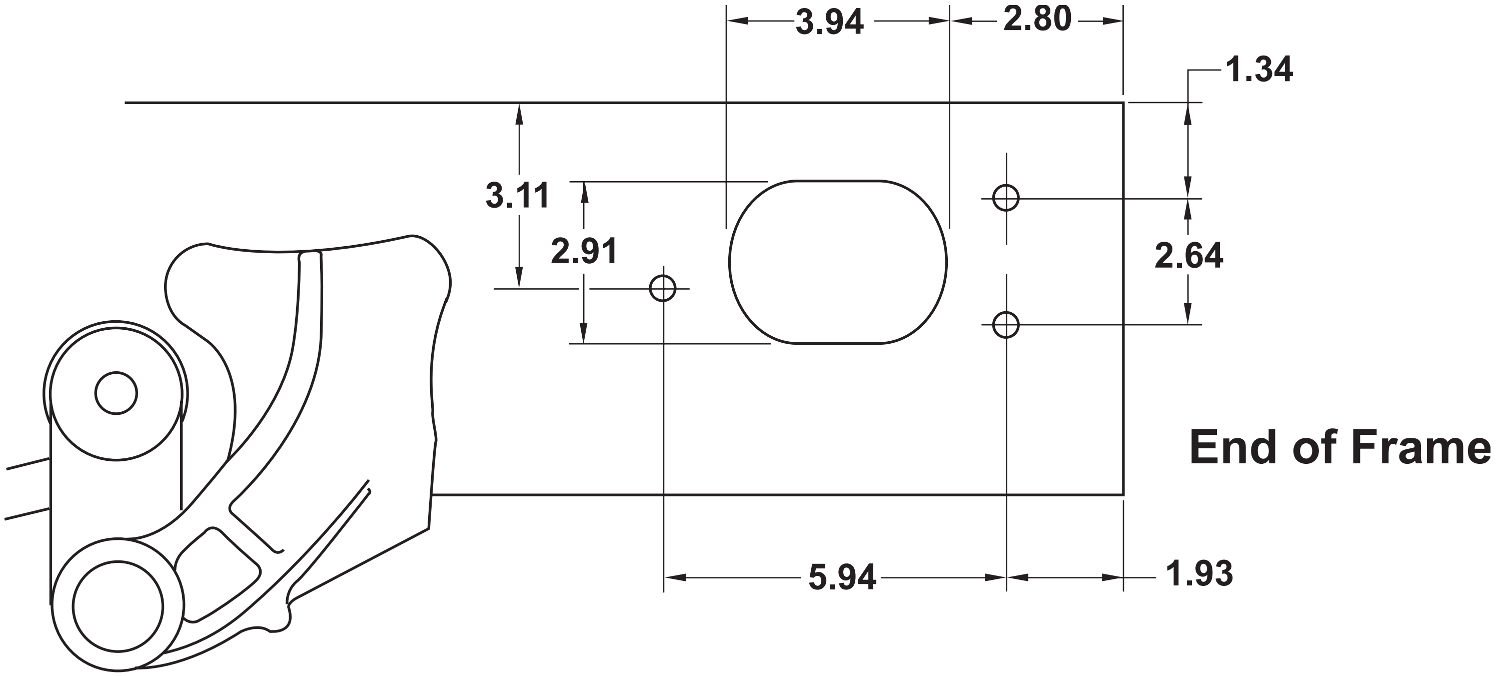
1. The decal must be placed as close as possible to the fuel inlet and be **clearly visible.**
2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
4. For installed bodies that have a fuel door , the decal should be placed above or to the side of the fuel door.

Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

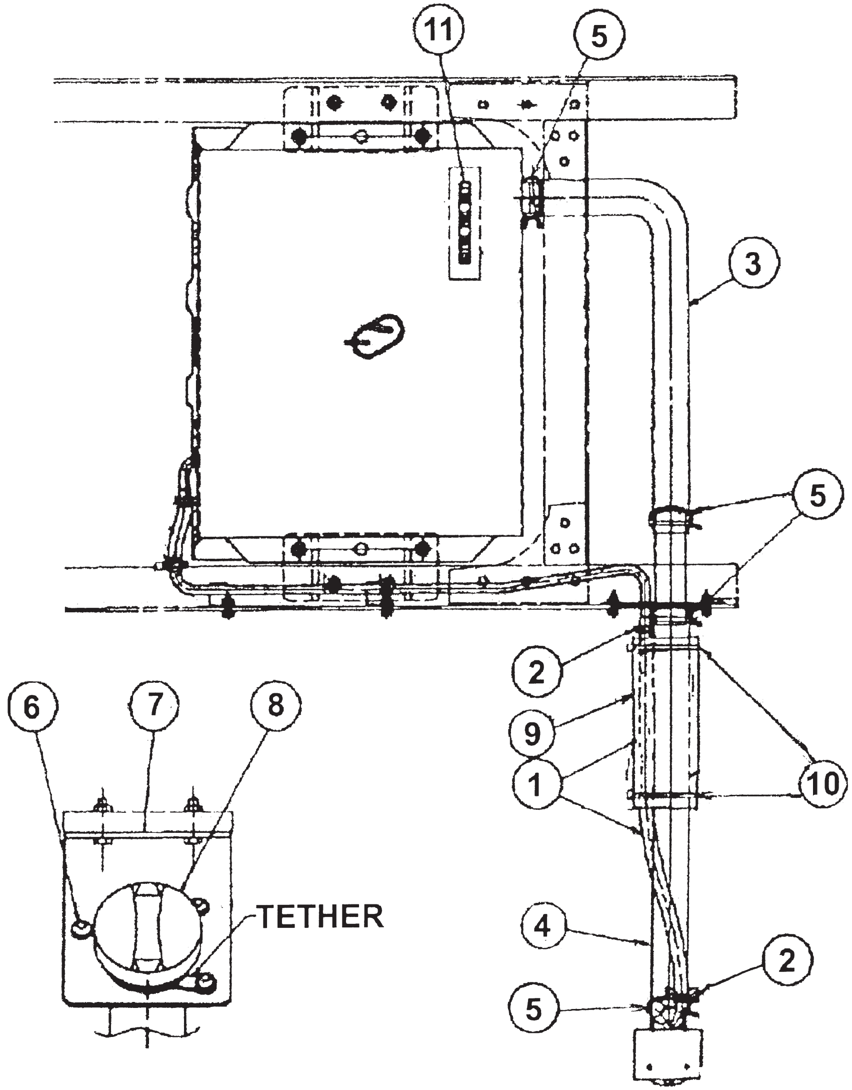
Through the Rail Fuel Fill Frame Hole


3.94
2.80
1.34
3.11
2.91
2.64
End of Frame
5.94
1.93

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

NQR/W5500 Diesel Fuel Fill Parts Illustration



(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

NQR/W5500 Diesel Fuel Fill Parts List

Number	Part Name	Isuzu Part Number	GM Part Number	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1071	94062296	2
11	Caution Plate	N/A	15798339	1

NPR HD/W4500, NQR/W5500 Crew Cab Diesel

Specifications

Model	NPR HD/W4500 Crew Cab Diesel	NQR/W5500 Crew Cab Diesel
GVWR	14,500 lbs.	17,950 lbs.
WB	150 in., 176 in.	
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.	
Model/Displacement	4HK1-TC/317 CID (5.19 liters)	
HP (Gross)	205 HP @ 2,400 RPM	
Torque (Gross)	441 lbs.-ft. torque @ 1,850 RPM	
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 in.^{2} radiator; 7-blade 20.1 in. diameter fan with viscous drive. Cold weather starting device an oil cooler. Engine oil level check switch and light.Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function. Rear engine cover.	
Transmission*	Aisin A465 6-speed overdrive automatic transmission with lock-up capability in 2nd through 6th. PTO capability.	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt & telescoping steering column.	Integral power steering 18.8-20.9:1 ratio. Tilt & telescoping steering column.
Front Axle	Reverse Elliot "I"-Beam rated at 6,830 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	Semi-elliptical steel alloy leaf springs with stabilizer bar and shock absorbers.
GAWR	5,360 lbs.	6,830 lbs.
Rear Axle	Full-floating single-speed with hypoid gearing rated at 14,550 lbs.	Full-floating single-speed with hypoid gearing rated at 14,550 lbs.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	Semi-elliptical steel alloy leaf springs and shock absorbers.
GAWR	9,880 lbs.	12,980 lbs.
Wheels	16 x 6.0k 6-hole disc wheels, painted white.	19.5 x 6.00 6-hole disc wheels, painted white.
Tires	215/85R 16E (10 pr) tubeless steel-belted radials, all-season front/rear.	225/70R 19.5F (12 pr) tubeless steel-belted radials, all-season front/rear.
Brakes	Dual circuit power assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The paking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operated. Four channel anti-lock brake system.	

NOTE: These selected specifications are subject to change without notice. *All Transmissions have a PTO gear in all wheelbases.

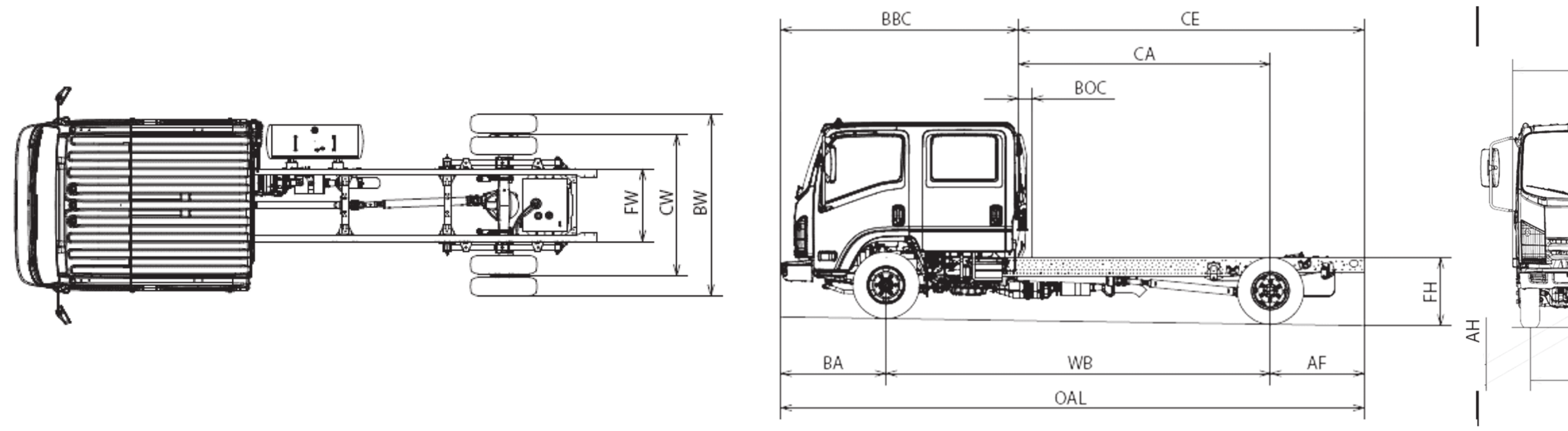
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Model	NPR HD/W4500 Crew Cab Diesel	NQR/W5500 Crew Cab Diesel
Fuel Tank	30-gallon rectangular steel fuel tank mounted in frame rail behind rear axle. Heated fuel/water separator mounted on rail with dash mounted indicator light.	
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 11.89 in.^{3}, RBM 523,160 lbs.-ft./in. per rail.	
Cab	All-steel, 7-passenger, low cab forward, BBC 109.9in.	
Equipment	TRICOT breatheable cloth covered high back driver's seat with two-occupant passenger seat. Four passenger rear bench seat. Dual cab mounted exterior mirrors with integral convex mirrors. Tilt and telescoping steering column. Power windows & door locks, front floor mat, tinted glass.	
Electrical	12-volt, negative ground, dual Delco maintenance-free batteries, 750 CCA each, 110-amp alternator with integral regulator.	
Options	AM/FM CD stereo radio, engine block heater, engine oil pan heater. Fuel tank mounted on right-hand rail (33 gal), spare wheel, wheel simulators, air deflector ,air conditioning, PTO enable switches, back up alarm, heated mirrors, engine shutdown and hour meter.	

NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings



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(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

NPR HD/W4500 Variable Chassis Dimensions					
Unit	**WB**	**CA***	**CE***	**OAL**	**AF**
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

* Effective CA & CE are CA or CE less BOC.

NPR HD/W4500 Dimension Constants					
Code	**Inches**	**Code**	**Inches**	**Code**	**Inches**
AH	7.5	BW	83.3	FH	31.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	90.0		
BOC	5.0	OW	81.4		

NPR HD/W4500 In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NG3	150.0 in.	lb.	4,264	2,189	6,453	8,047
NG4	176.0 in.	lb.	4,347	2,174	6,521	7,979

NPR HD/W4500 Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NG3	150.0 in.	lb.	4,426	1,969	6,395	8,105
NG4	176.0 in.	lb.	4,481	1,982	6,463	8,037

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

NQR/W5500 Variable Chassis Dimensions					
Unit	**WB**	**CA***	**CE***	**OAL**	**AF**
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

* Effective CA & CE are CA or CE less BOC.

NQR/W5500 Dimension Constants					
Code	**Inches**	**Code**	**Inches**	**Code**	**Inches**
AH	8.6	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	91.1		
BOC	5.0	OW	81.4		

NQR/W5500 In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NS3	150.0 in.	lb.	4,422	2,447	6,869	11,081
NS4	176.0 in.	lb.	4,499	2,434	6,933	11,017

NQR/W5500 Side-Mounted Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NS3	150.0 in.	lb.	4,599	2,220	6,819	11,131
NS4	176.0 in.	lb.	4,646	2,237	6,883	11,067

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Vehicle Weight Limits:

	NPR HD/W4500	**NQR/W5500**
GVWR Designed Maximum	14,500 lbs.	17,950 lbs.
GAWR, Front	5,360 lbs.	6,830 lbs.
GAWR, Rear	9,880 lbs.	12,980 lbs.

Technical Notes:

Chassis Curb Weight includes standard equipment and fuel. Does not include driver, passenger, payload, body or special equipment.

Maximum Payload Weight is the allowed maximum for equipment, body, payload, driver and passengers and is calculated by subtracting chassis curb weight from the GVWR.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

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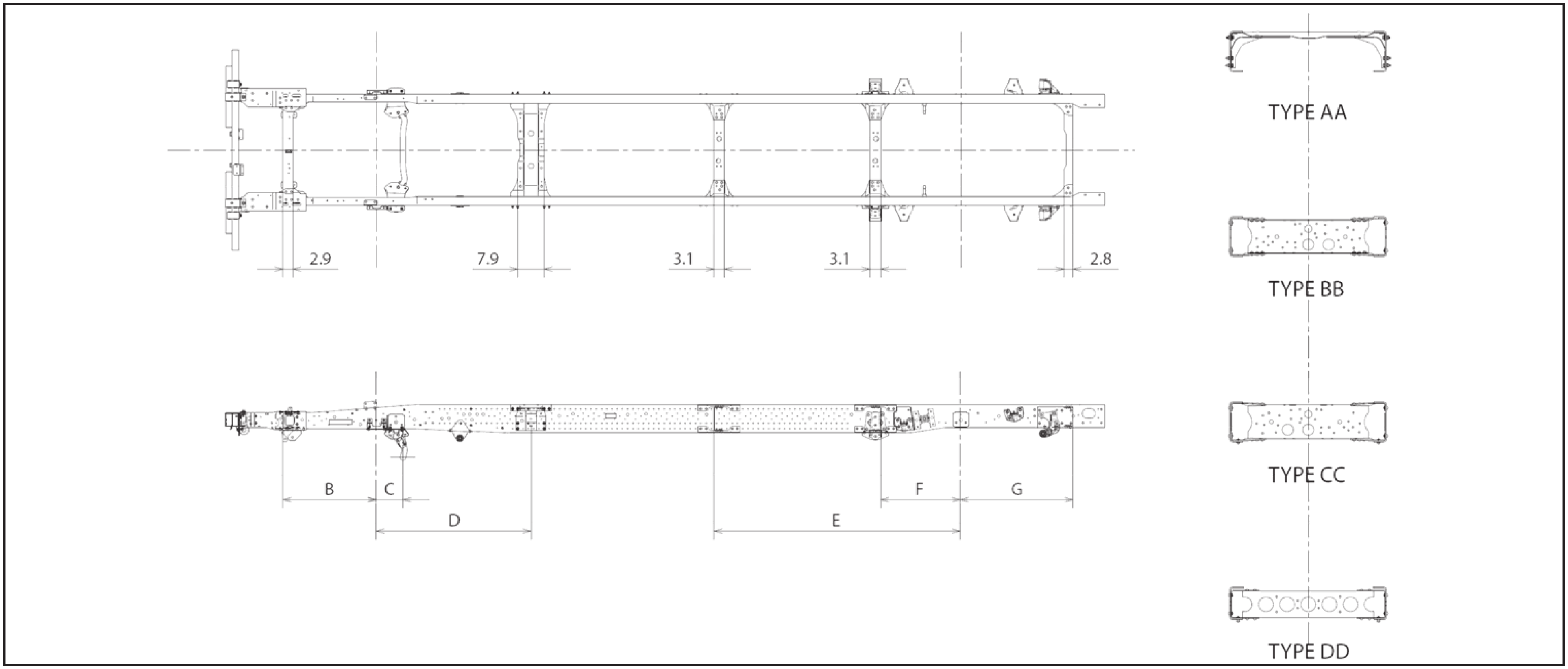
Frame and Crossmember Specifications



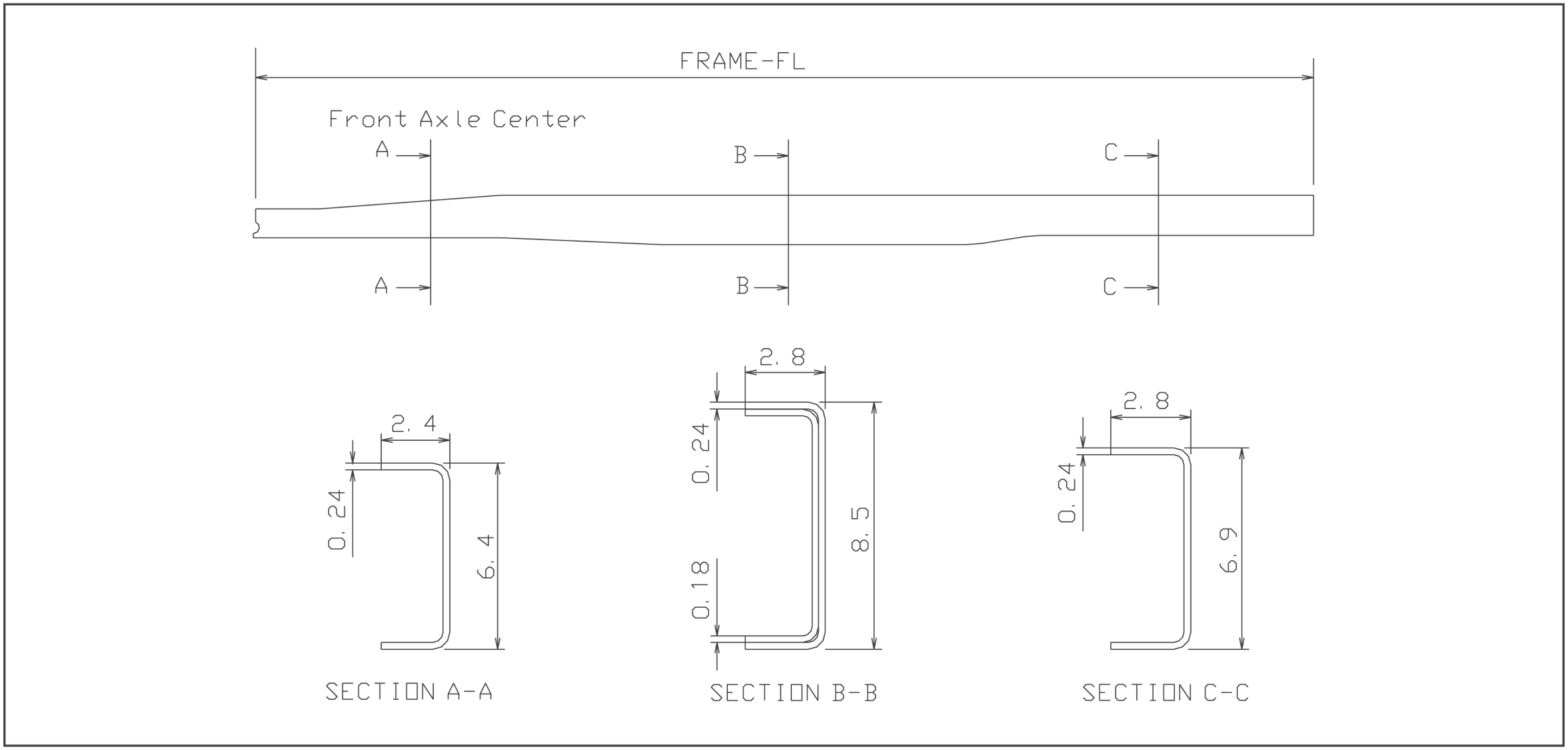
Wheelbase	Frame Thick	Crossmember Type/Location					
		B	C-A/T	D-A/T	E	F	G
150.0	0.24	28.3	7.9	AA 46..5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24	28.3	7.9	AA 46.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Frame Chart


FRAME-FL
Front Axle Center
A
B
C
A
B
C
2.4
0.24
6.4
2.8
0.24
0.18
8.5
2.8
0.24
6.9
SECTION A-A
SECTION B-B
SECTION C-C

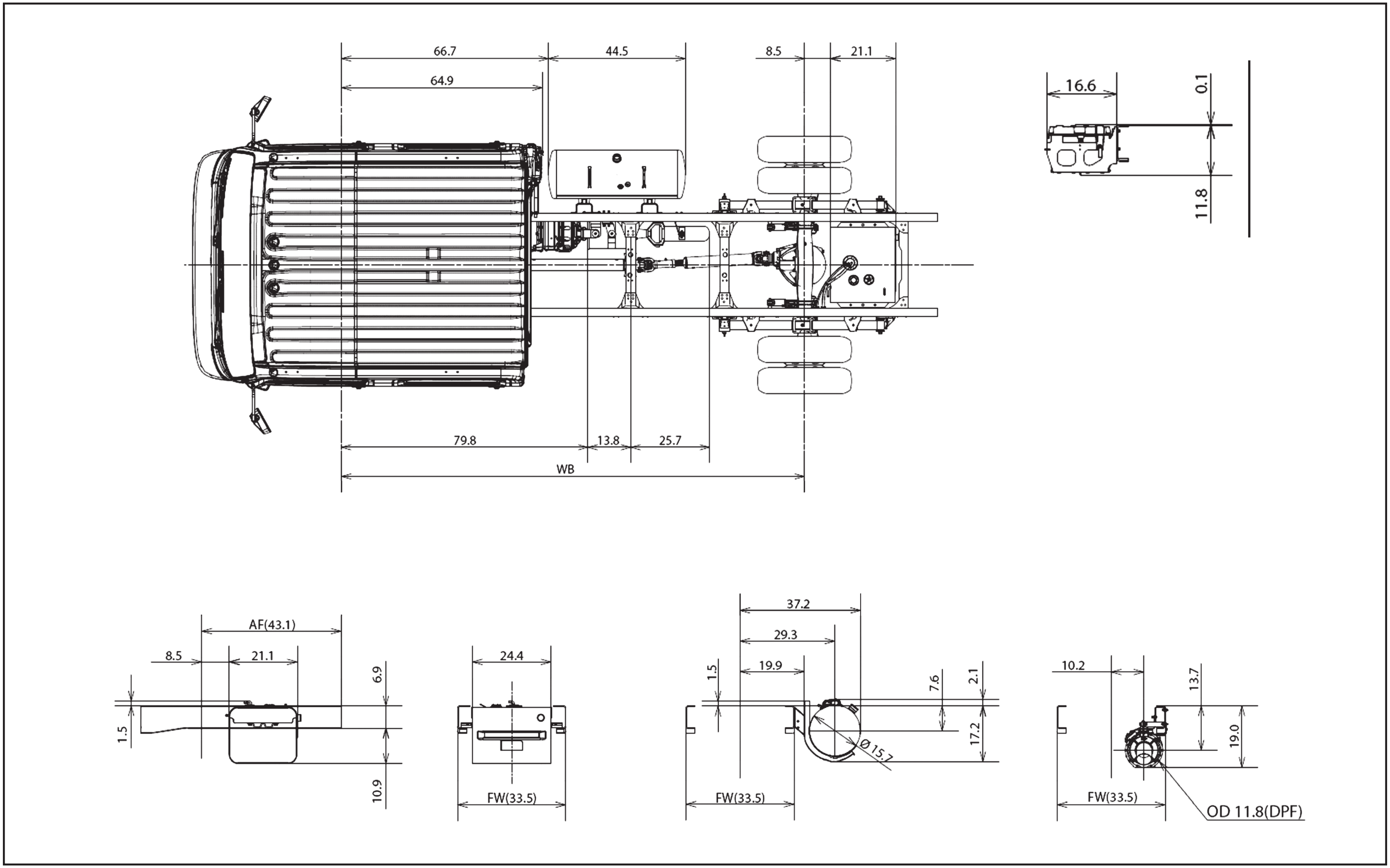
Wheelbase	Frame FL	Frame Thickness
150.0	223.8	0.24 + 0.18
176.0	249.8	0.24 + 0.18

Note: On this model chassis, GMICT will require that the body installed on the chassis have an understructure manufactured with any of the following structural steel “C” channels: 4" x 1-5/8", 7.5 lb./ft.; 5" x 1-3/4", 6, 7 or 9.0 lb./ft.; 6" x 2", 8.2, 10.5 or 13 lb./ft.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Auxiliary Views 150" Wheelbase

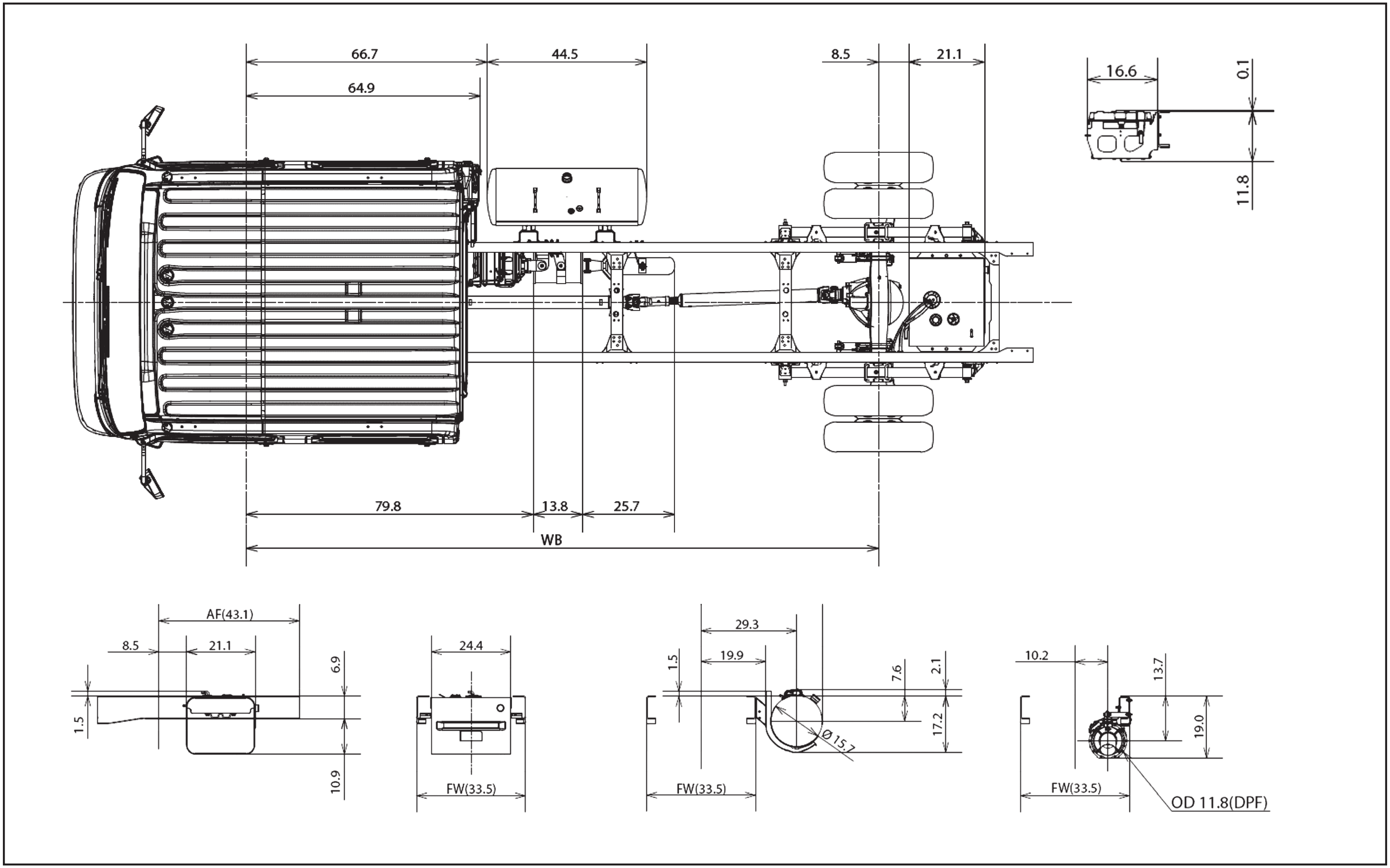


66.7
44.5
8.5
21.1
64.9
16.6
0.1
11.8
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Auxiliary Views 176" Wheelbase


66.7
44.5
64.9
8.5
21.1
16.6
0.1
11.8
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

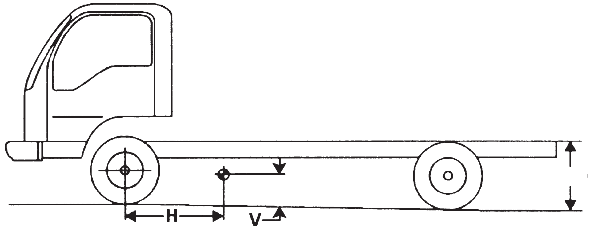
Body Builder Weight Information Chart

NPR/W4500 Series

		Wheelbase				
GVWR	Axle	150		176		Unsprung Weight
		in frame tank	side tank	in frame tank	side tank	
14,500	Front	4,264	4,426	4,347	4,481	617
	Rear	2,189	1,969	2,174	1,982	1,058
	Total	6,453	6,395	6,521	6,463	1,675

Center of Gravity

GVWR	WB	V	H	
			in frame tank	side tank
14,500	150	25.9	50.9	46.2
	176	25.8	58.7	54.0



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed **63** inches above ground level for the **14,500** lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NPR-HD/W4500 are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by GM/Isuzu Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-404-257-3013.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

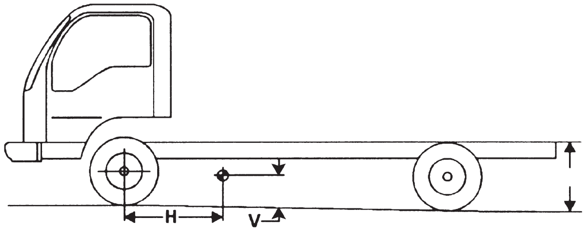
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

NQR/W5500 Series

GVWR	Axle	Wheelbase				Unsprung Weight
		in frame tank	side tank	in frame tank	side tank	
17,950	Front	4,422	4,599	4,499	4,646	661
	Rear	2,447	2,220	2,434	2,237	1,058
	Total	6,869	6,819	6,933	6,883	1,675

Center of Gravity

GVWR	WB	V	H	
			inframe tank	side tank
14,500	150	26.9	53.4	48.8
	176	26.9	61.8	57.2



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

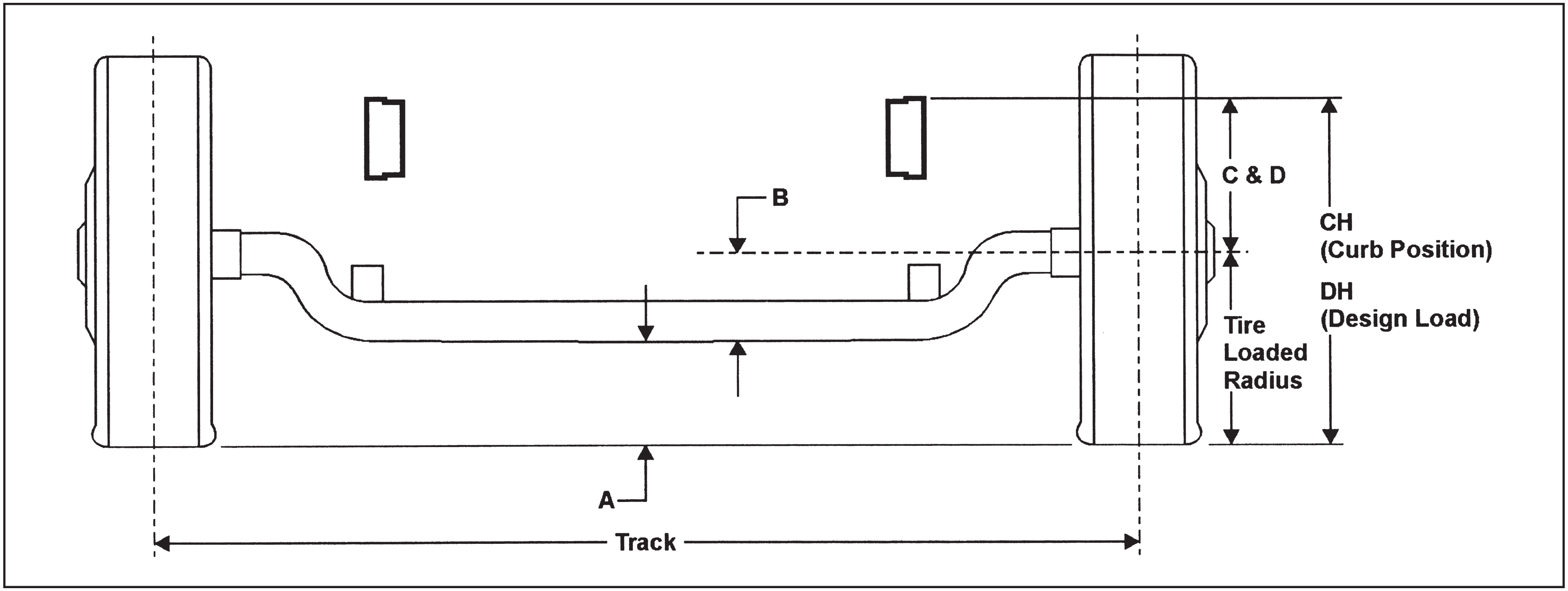
The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the **17,950** lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NQR/W5500 are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by GM/Isuzu Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-678-240-9818.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Front Axle Chart NPR HD/W4500



Formulas for calculating height dimensions:

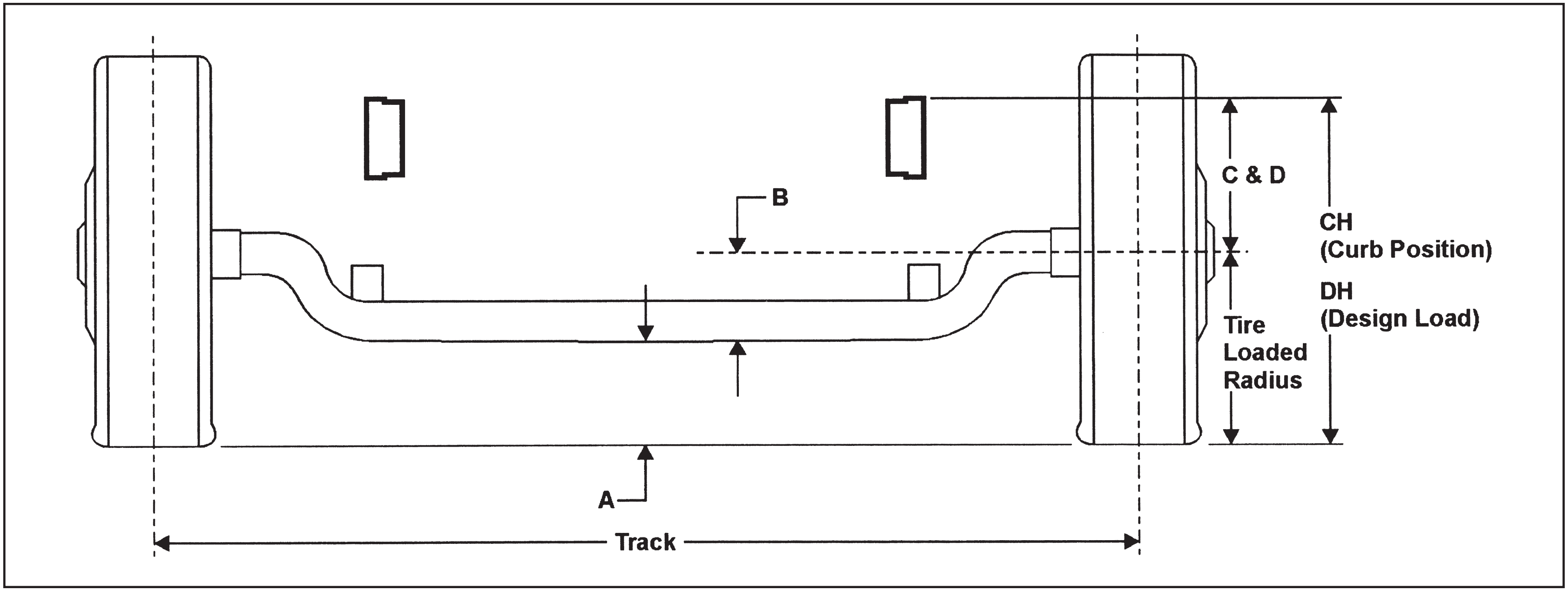
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16E	14,500 lbs.	5,360 lbs.	7.5	6.6	11.9	11.7	26.5	25.8	65.5	14.6	14.1

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Front Axle Chart NQR/W5500



Formulas for calculating height dimensions:

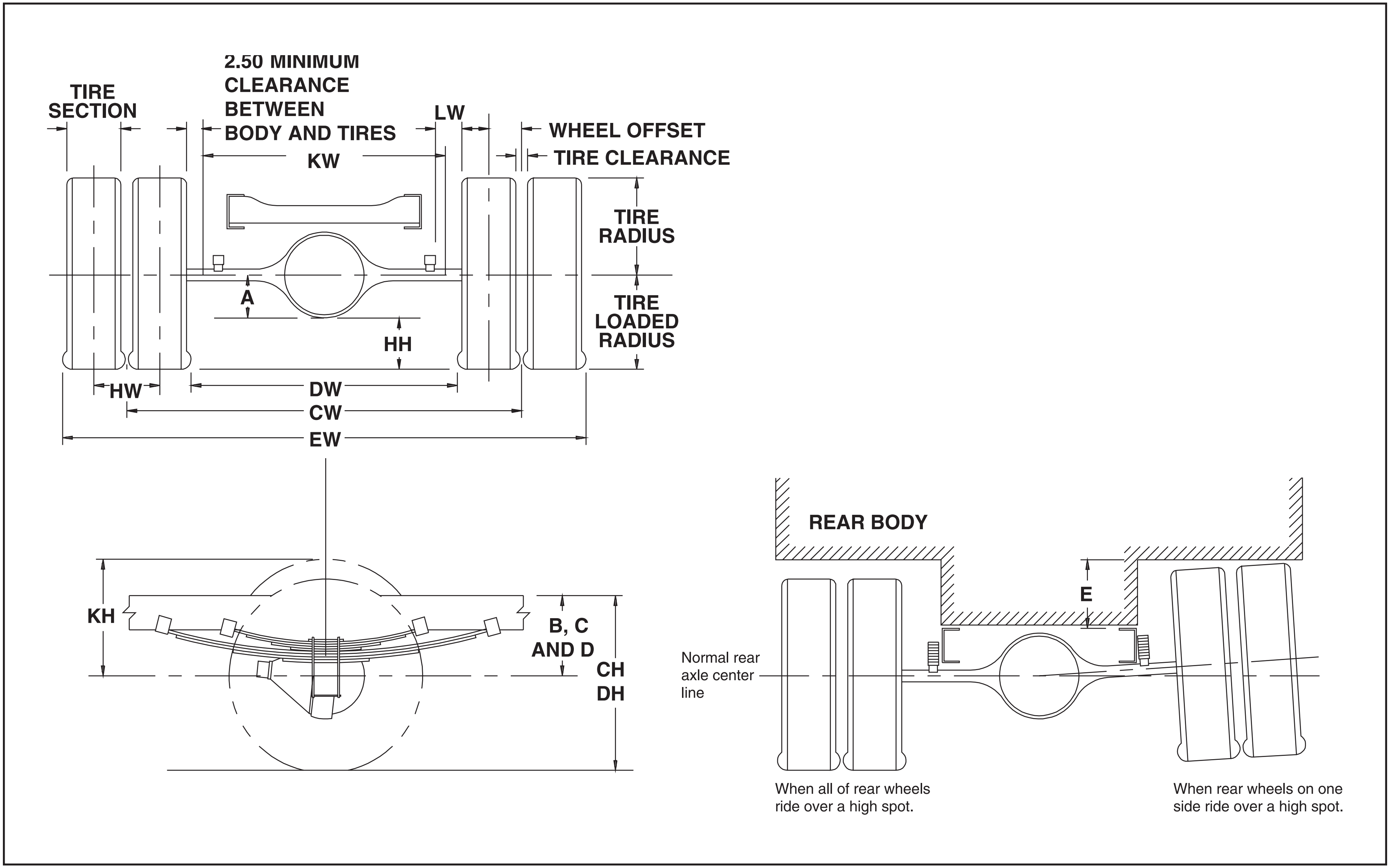
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	17,950 lbs.	6,830 lbs.	8.6	6.6	12.3	11.5	28.4	26.7	65.5	16.1	15.24

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Rear Axle Chart NPR HD/W4500


2.50 MINIMUM CLEARANCE BETWEEN BODY AND TIRES
TIRE SECTION
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE RADIUS
A
TIRE LOADED RADIUS
HH
HW
DW
CW
EW
KH
B, C AND D
CH
DH
REAR BODY
E
Normal rear axle center line
When all of rear wheels ride over a high spot.
When rear wheels on one side ride over a high spot.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

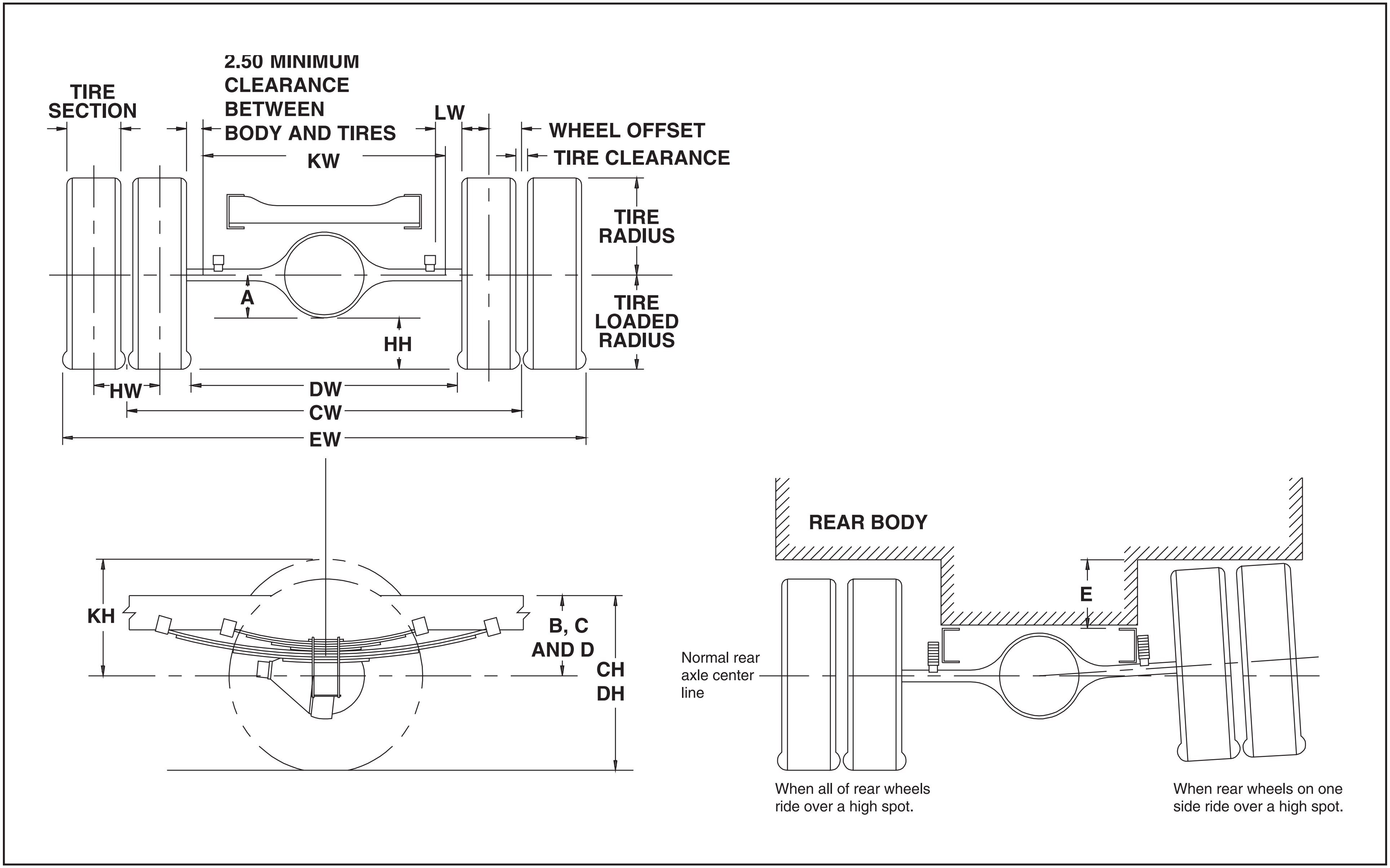
NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16E	9,880 lbs.	65.0	6.5	9.3	15.3	13.0	7.8

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Rear Axle Chart NQR/W5500


2.50 MINIMUM CLEARANCE BETWEEN BODY AND TIRES
TIRE SECTION
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE RADIUS
A
TIRE LOADED RADIUS
HH
HW
DW
CW
EW
KH
B, C AND D
CH
DH
REAR BODY
E
Normal rear axle center line
When all of rear wheels ride over a high spot.
When rear wheels on one side ride over a high spot.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

NOTE: Track and overall width may vary with optional equipment.

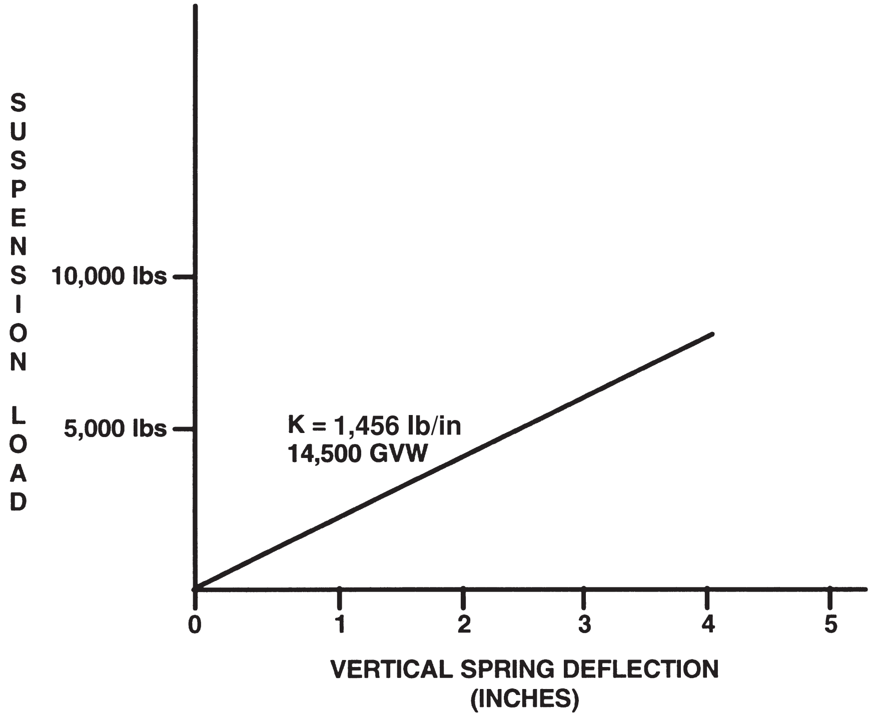
Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	12,980 lbs.	65.0	7.7	9.3	15.5	13.4	8.4

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

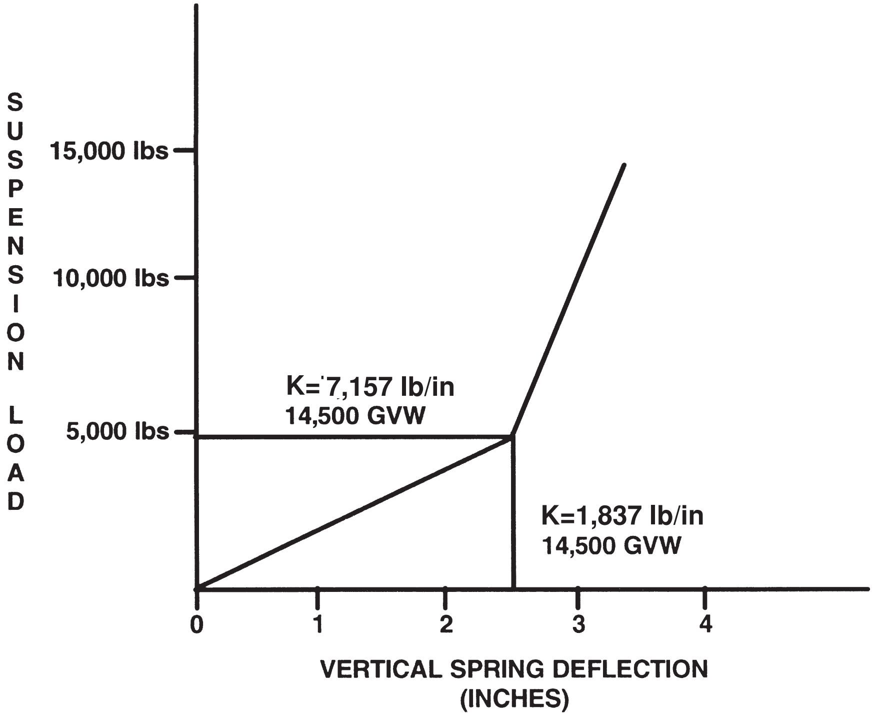
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Suspension Deflection Charts NPR HD/W4500

Front Leaf Spring Load vs. Deflection (Per Axle)



Rear Leaf Spring Load vs. Deflection (Per Axle)



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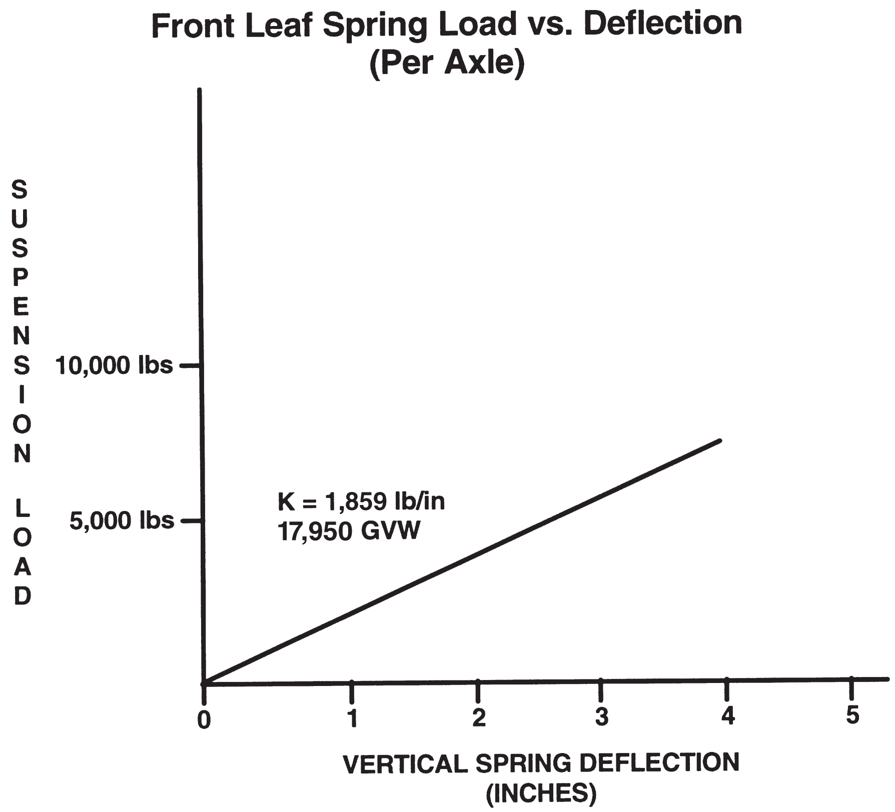
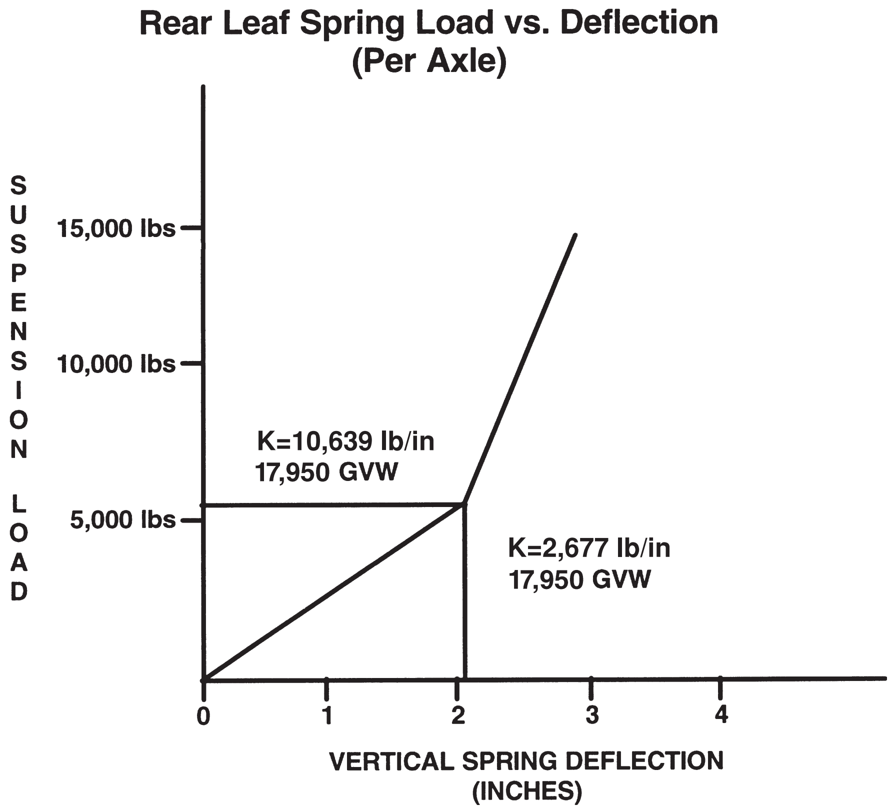
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Suspension Deflection Charts NQR/W5500





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(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Tire and Disc Wheel Chart NPR HD/W4500

Tire

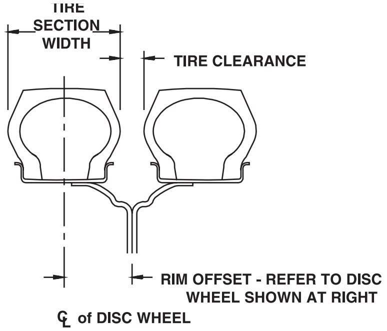
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16E	2,680	80	2,470	80	5,360	9,880	14,500

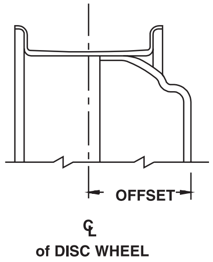
Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16E	14,500	14.1	14.1	14.6	14.6	8.2	18	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16.6 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	289 ft.-lb. (392 N•m)	6.46	5.0	0.39	5º DC	Steel TOPY

* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL


OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Tire and Disc Wheel Chart NQR/W5500

Tire

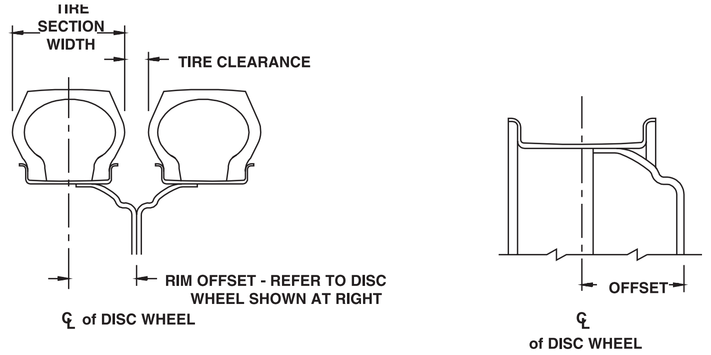
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	6,900	12,980	17,950

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	17,950	14.93	14.98	16	16	8.7	1.3	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	15º DC	Steel TOPY

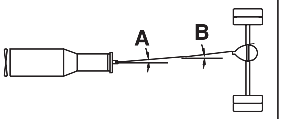
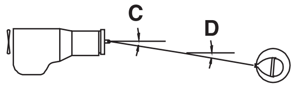
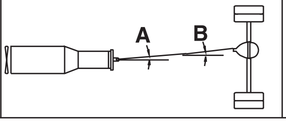
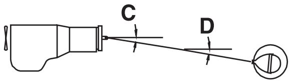
* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

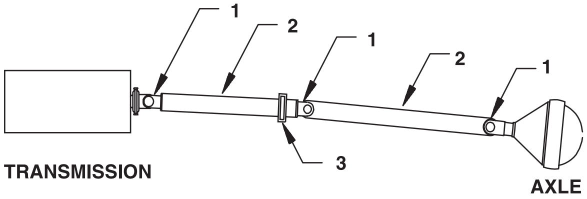
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Propeller Shaft NPR HD/W4500

WB	PLANE VIEW	SIDE VIEW
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)



1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

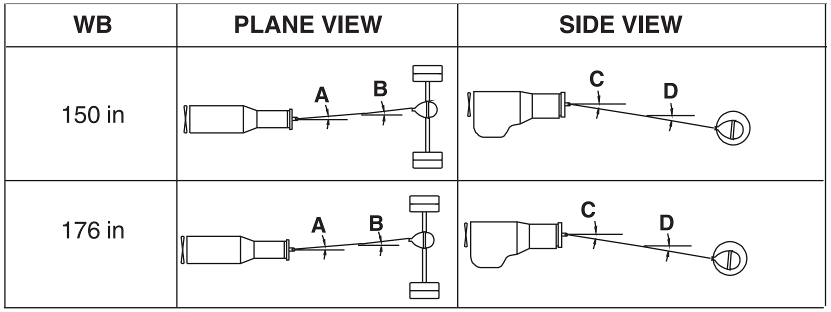
Wheelbase	Plane View		Side View	
	A Automatic Transmission	B Automatic Transmission	C Automatic Transmission	D Automatic Transmission
150 in.	0º	3.3º	1.8º	1.7º
176 in.	0º	2.2º	0.4º	3.4º

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

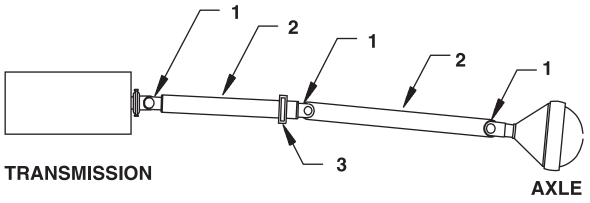
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Propeller Shaft NQR/W5500



TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)



1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

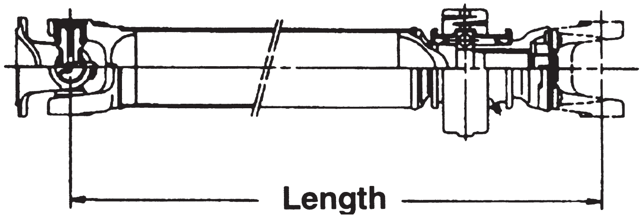
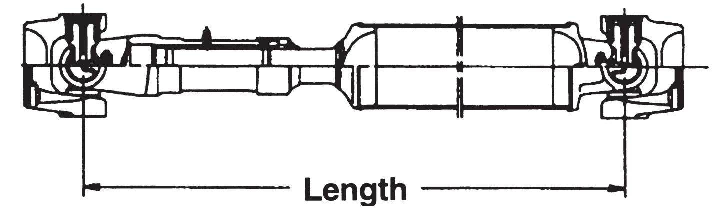
Wheelbase	Plane View		Side View	
	A Automatic Transmission	B Automatic Transmission	C Automatic Transmission	D Automatic Transmission
150 in.	0°	3.3°	1.8°	1.8°
176 in.	0°	2.2°	0.4°	3.5°

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

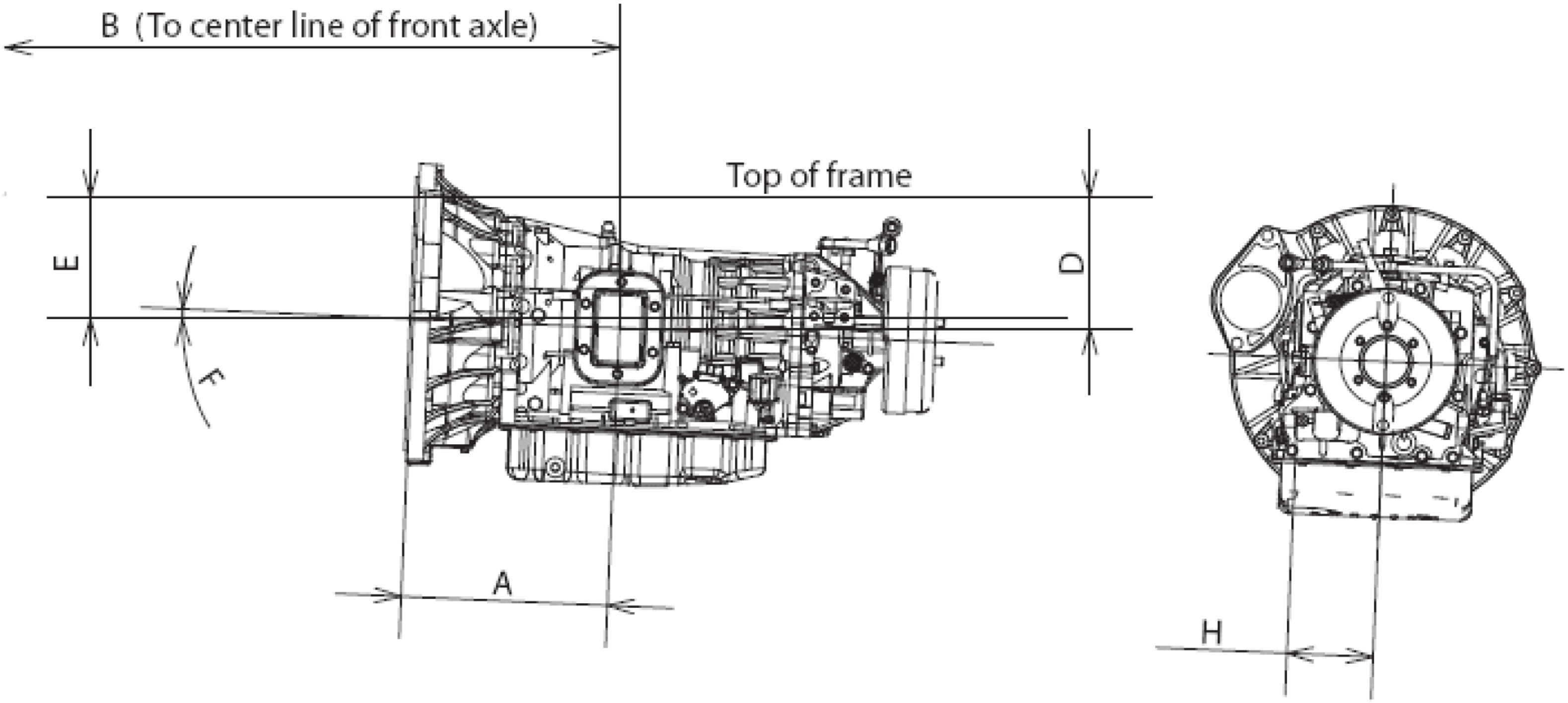
Wheelbase	150	176
Number of Shafts	2	2
Transmission Type	6 A/T	6 A/T
Shaft #1 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	41.8	51.3
Type	A	A
Shaft #2 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	36.4	52.9
Type	C	C

Type	Description	Model	Illustration
Type **A**	1st shaft in 2-piece driveline	P30	
Type **C**	2nd shaft in 2-piece driveline	P30	

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

PTO Location, Drive Gear and Opening Information

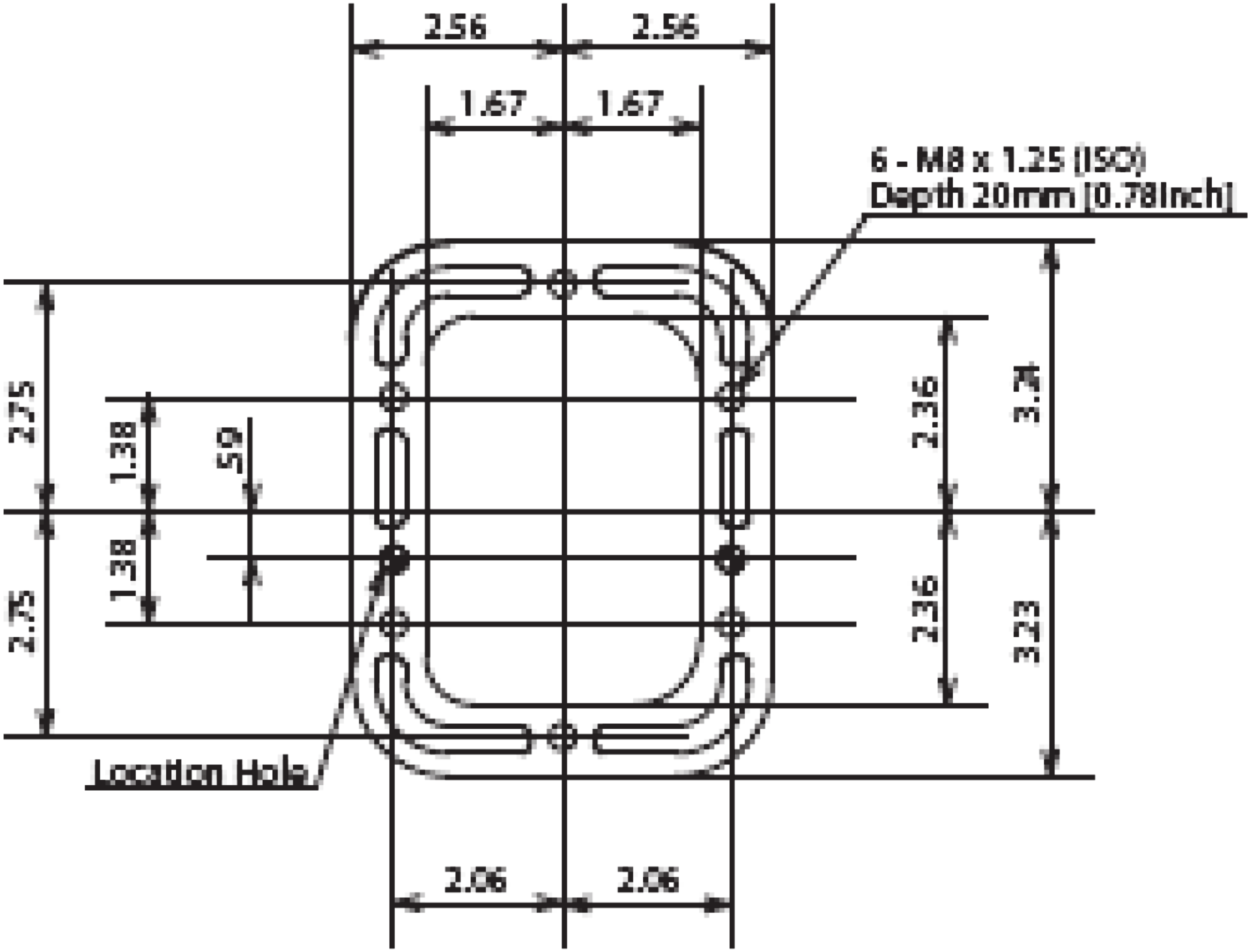


Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin 465	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5º	5.16	PTO Gear	1:1 with turbine	69	N/A	0º	134 lbs.-ft. @ 1,700 RPM

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Opening Diagram


2.56
2.56
1.67
1.67
6 - M8 x 1.25 (ISO)
Depth 20mm [0.78Inch]
2.75
1.38
.59
1.38
2.75
2.36
3.24
2.36
3.23
Location Hole
2.06
2.06

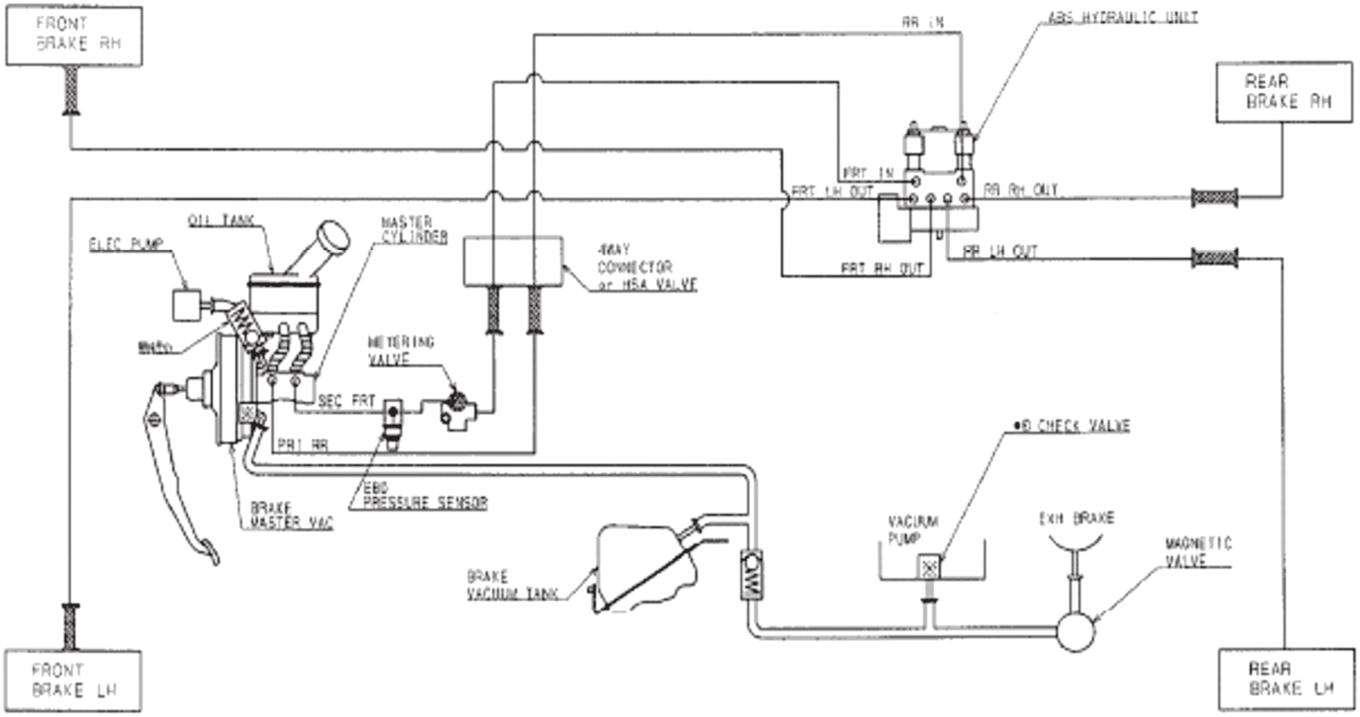
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

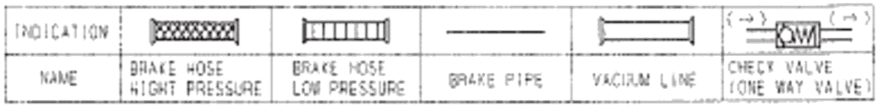
Brake System Diagram 14,500 GVW

Vacuum Over Hydraulic

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
OIL TANK
MASTER CYLINDER
ELEC PUMP
4WAY CONNECTOR or HSA VALVE
FRT RH OUT
RR LH OUT
METERING VALVE
SEC FRT
PRI RR
●D CHECK VALVE
EBD PRESSURE SENSOR
BRAKE MASTER VAC
VACUUM PUMP
EXH BRAKE
MAGNETIC VALVE
BRAKE VACUUM TANK
FRONT BRAKE LH
REAR BRAKE LH

NPR-HD/W4500 DIESEL 14,500 GVW


INDICATION
NAME
BRAKE HOSE HIGHT PRESSURE
BRAKE HOSE LOW PRESSURE
BRAKE PIPE
VACUUM LINE
CHECK VALVE (ONE WAY VALVE)

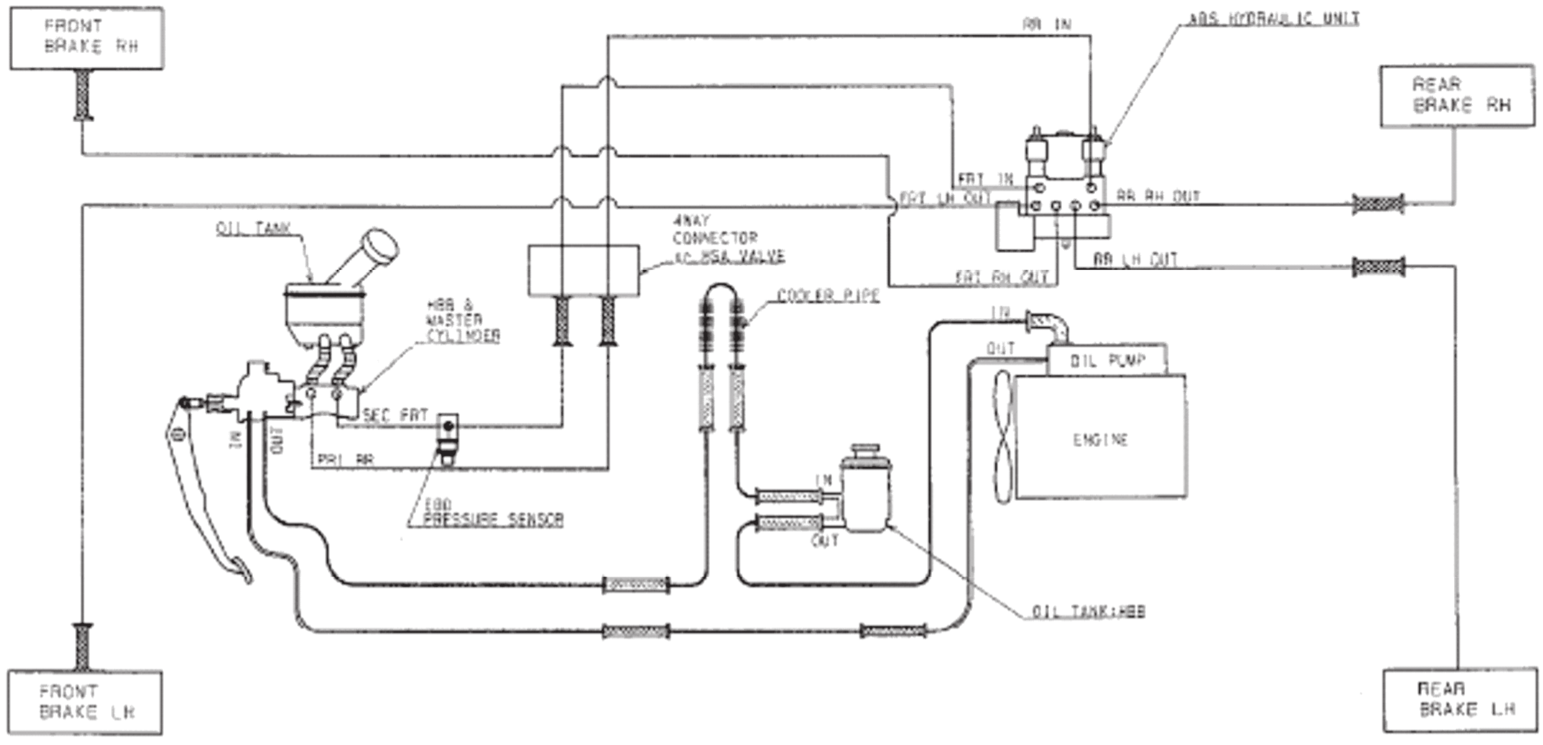
(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Brake System Diagram 17,950 GVW

Vacuum Over Hydraulic

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
OIL TANK
4WAY CONNECTOR w/ HSA VALVE
FRT RH OUT
RR LH OUT
COOLER PIPE
HBB & MASTER CYLINDER
IN
OUT
OIL PUMP
SEC FRT
PRI RR
IN
OUT
ENGINE
EBD PRESSURE SENSOR
IN
OUT
OIL TANK:HBB
FRONT BRAKE LH
REAR BRAKE LH

INDICATION	▩	▥	—	▨	▧	═	━
NAME	BRAKE HOSE HIGHT PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	HYDRAULIC HOSE (SUPPLY)	HYDRAULIC HOSE (RETURN/SUCTION)	HYDRAULIC PIPE (SUPPLY)	HYDRAULIC PIPE (RETURN/SUCTION)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Diesel Fuel Fill

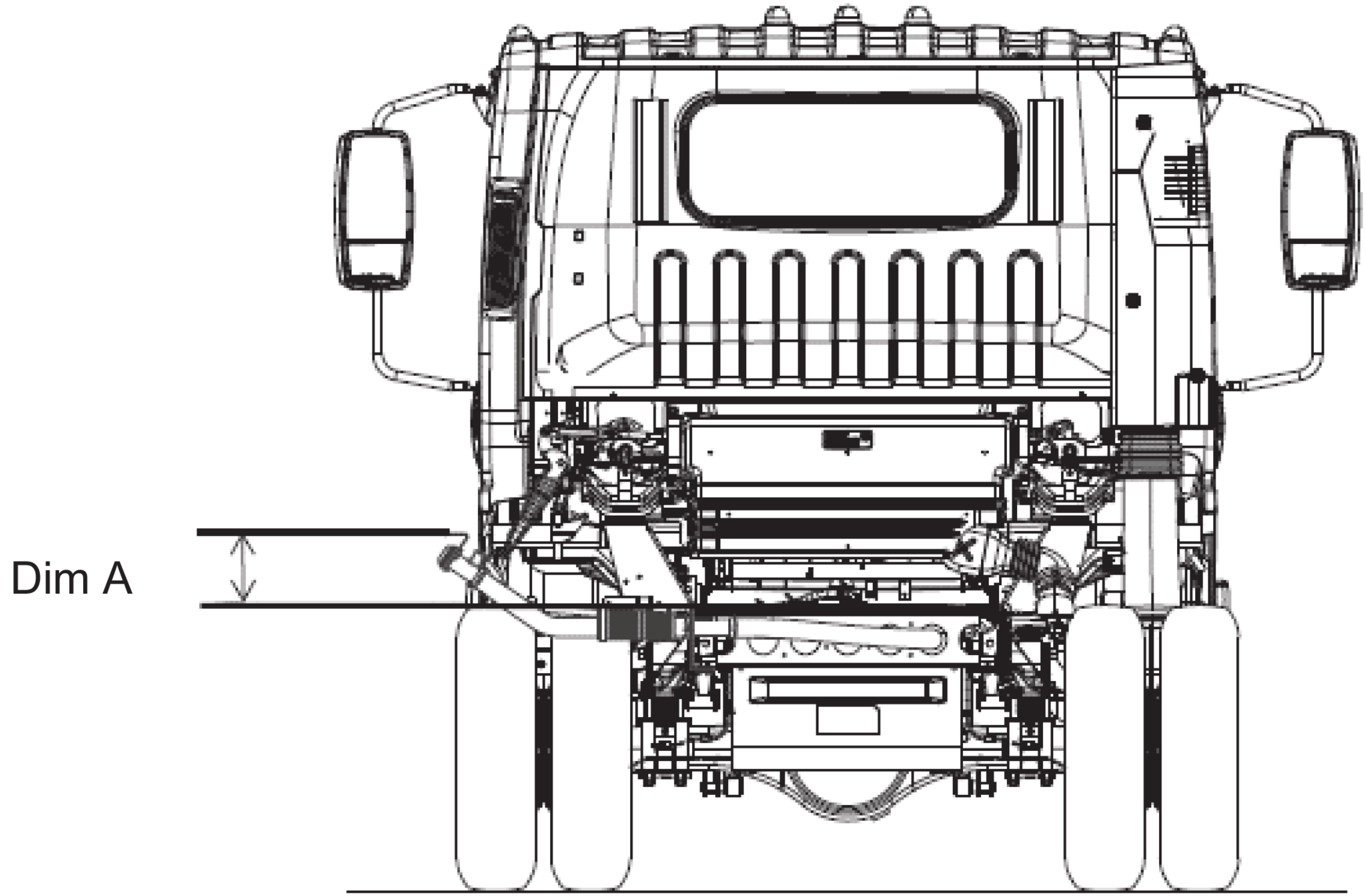
Installation Instructions

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver's side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Rear View Fuel Fill

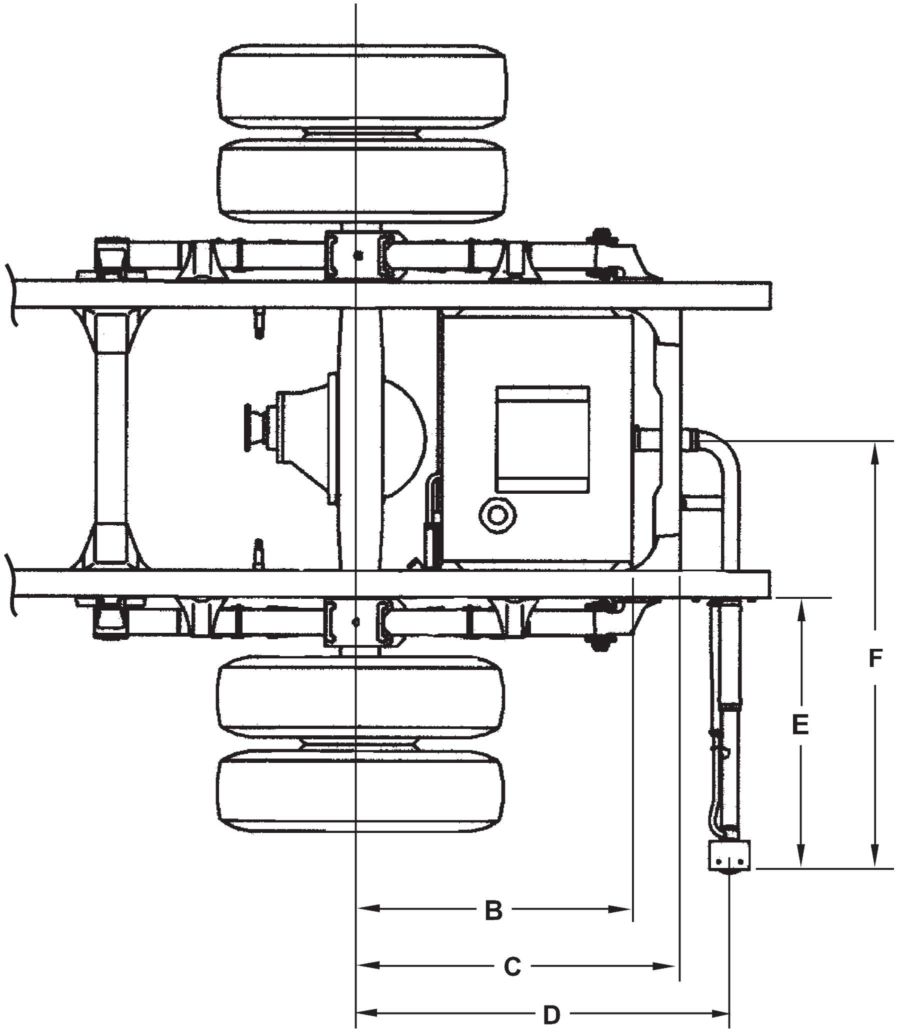


Dimension A = 6.85-8.5 inches (174-216 mm)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Top View Fuel Fill

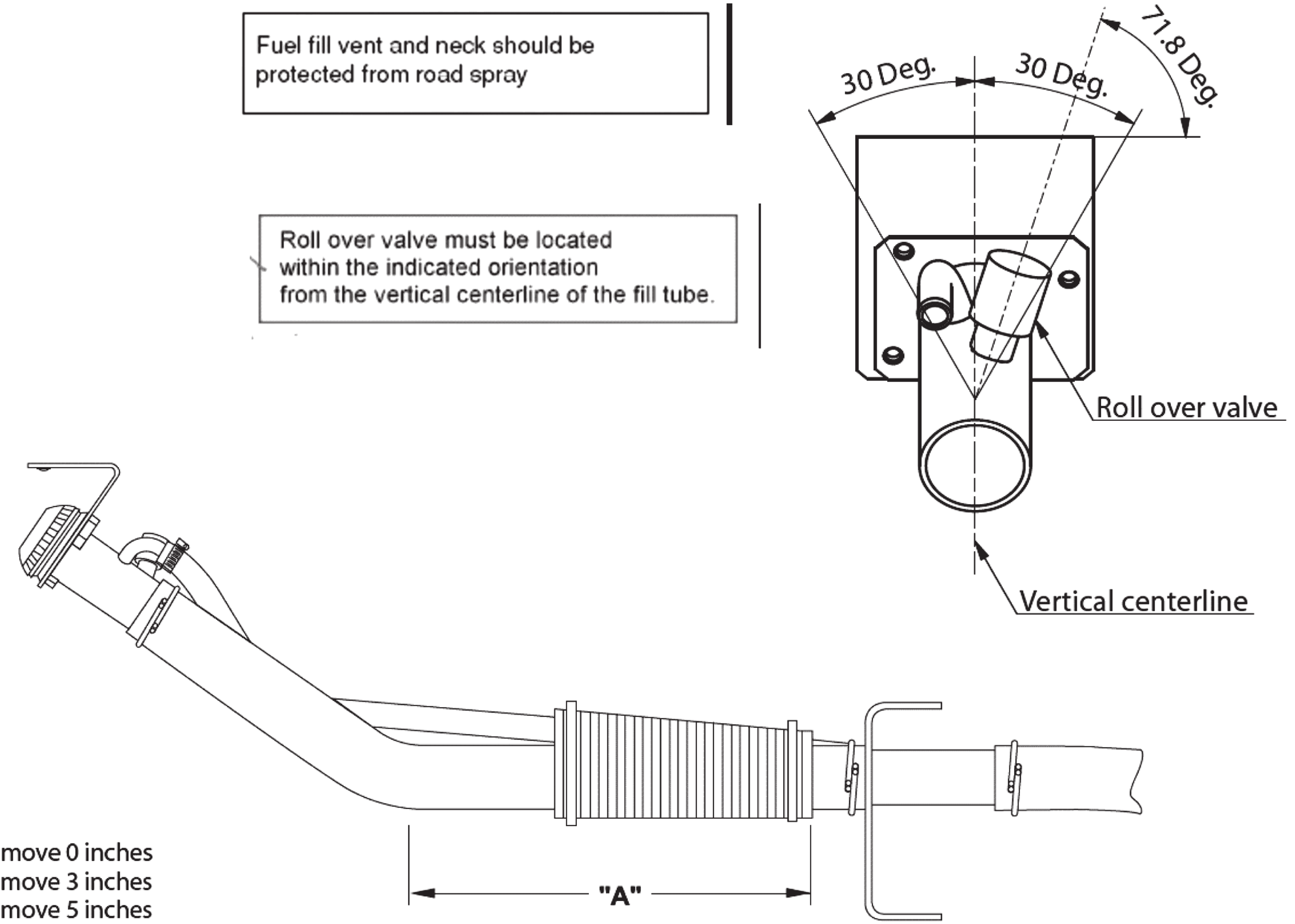


Dimensions:
B = 29.75 inches (756 mm)
C = 34.00 inches (863 mm)
D = 39.29 inches (998 mm)
E = 33.86 inches (784 mm)
F = 59.60 inches (1,438 mm)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



Fuel fill vent and neck should be protected from road spray

Roll over valve must be located within the indicated orientation from the vertical centerline of the fill tube.

102 remove 0 inches
96 remove 3 inches
90 remove 5 inches
86 remove 8 inches
80 remove 8 inches

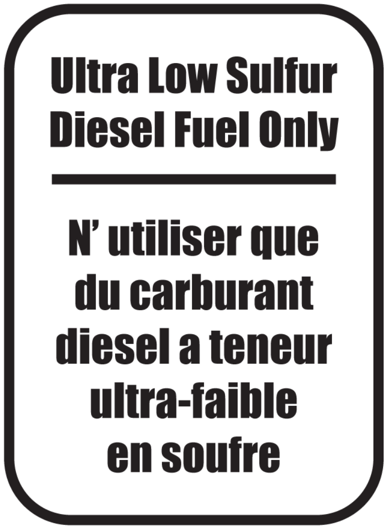
NOTE: Shorten Hose at "A" Area only.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Ultra Low Sulfur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),
The decal illustrated below must be installed on the vehicle.
The decal is included in the fuel fill parts box.



Ultra Low Sulfur
Diesel Fuel Only

N' utiliser que
du carburant
diesel a teneur
ultra-faible
en soufre

INSTRUCTIONS FOR DECAL PLACEMENT:

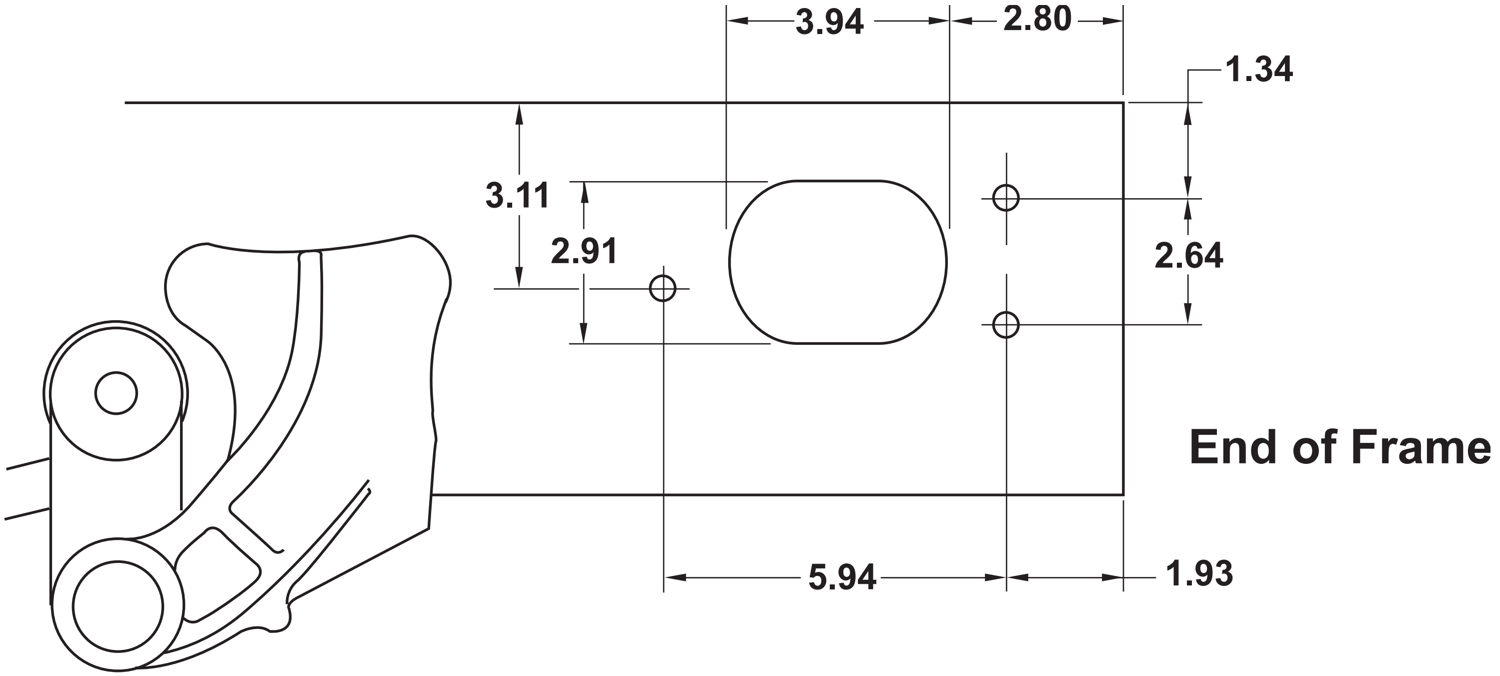
1. The decal must be placed as close as possible to the fuel inlet and be **clearly visible.**
2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
4. For installed bodies that have a fuel door , the decal should be placed above or to the side of the fuel door.

Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

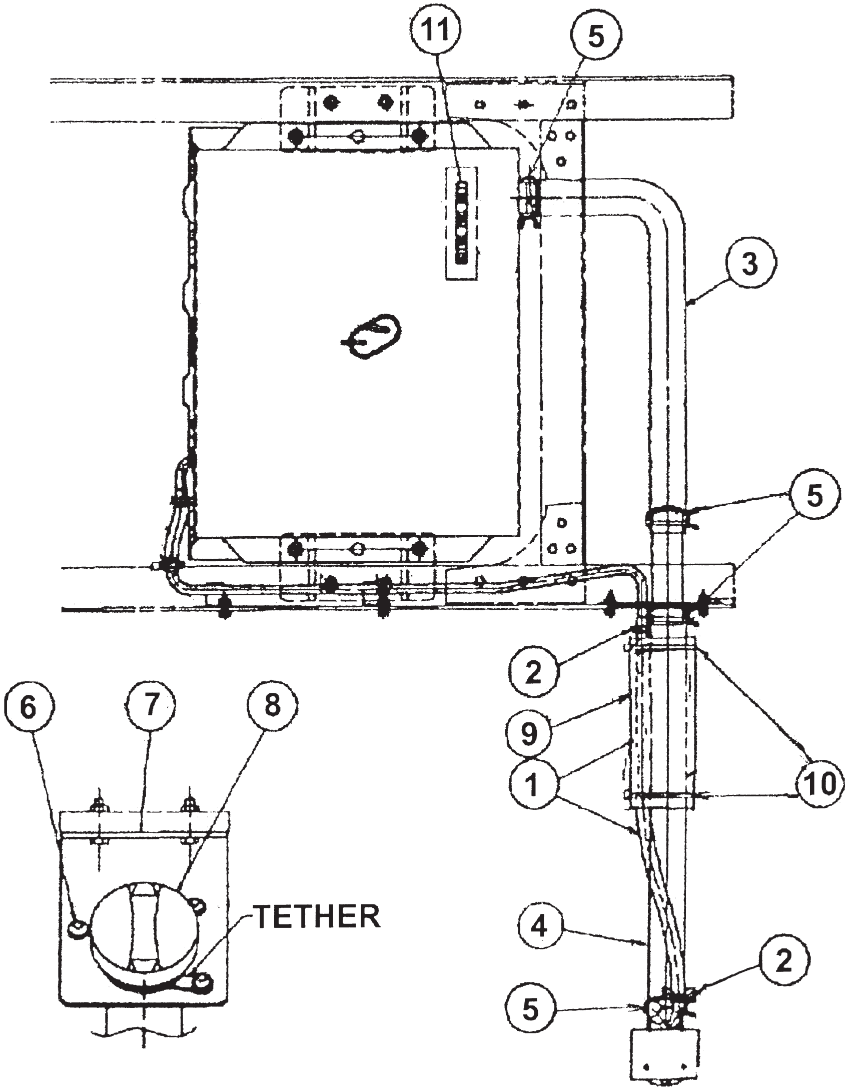
Through the Rail Fuel Fill Frame Hole


3.94
2.80
1.34
3.11
2.91
2.64
End of Frame
5.94
1.93

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Fuel Fill Parts Illustration



(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued on next page)

(Vehicle Specifications Index Section – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – continued from previous page)

Fuel Fill Parts List

Number	Part Name	Isuzu Part Number	GM Part Number	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1070	94062296	2
11	Caution Plate	N/A	15798339	1

NRR/W5500-HD Specifications

Model	NRR/W5500-HD
GVWR/GCWR	19,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.
Model/Displacement	4HK1-TC/317CID (5.19 liters)
HP (Gross)	205 HP @ 2,400 RPM
Torque (Gross)	441 lbs.-ft. torque @ 1,850 RPM
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 in.^{2} radiator; 7-blade 20.1 in. diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function. Rear engine cover.
Clutch	Single, dry plate, 12.8 in. dia. ceramic, actuated by self-adjusting hydraulic master/slave cylinder.
Transmission	Aisin A465 6-speed overdrive automatic transmission with lock-up capability in 2nd through 6th. PTO capability all chassis and wheelbases.
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.
Front Axle	Reverse Elliot “I”-Beam rated at 6,830 lbs.
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.
GAWR	6,830 lbs.
Rear Axle	Full-floating, single speed with hypoid gearing rated at 14,550 lbs.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	13,660 lbs.
Wheels	19.5 x 6.0 6-hole disc wheels, painted white.
Tires	225/70R 19.5F (12 pr) tubeless steel-belted radials, all season tread front and rear.
Brakes	Dual circuit, power assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operation. 4 channel anti-lock brake system.
Fuel Tank	30-gallon rectangular steel fuel tank mounted in frame rail behind rear axle. Heated fuel/water separator mounted on rail with dash mounted indicator light.

NOTE: These selected specifications are subject to change without notice.

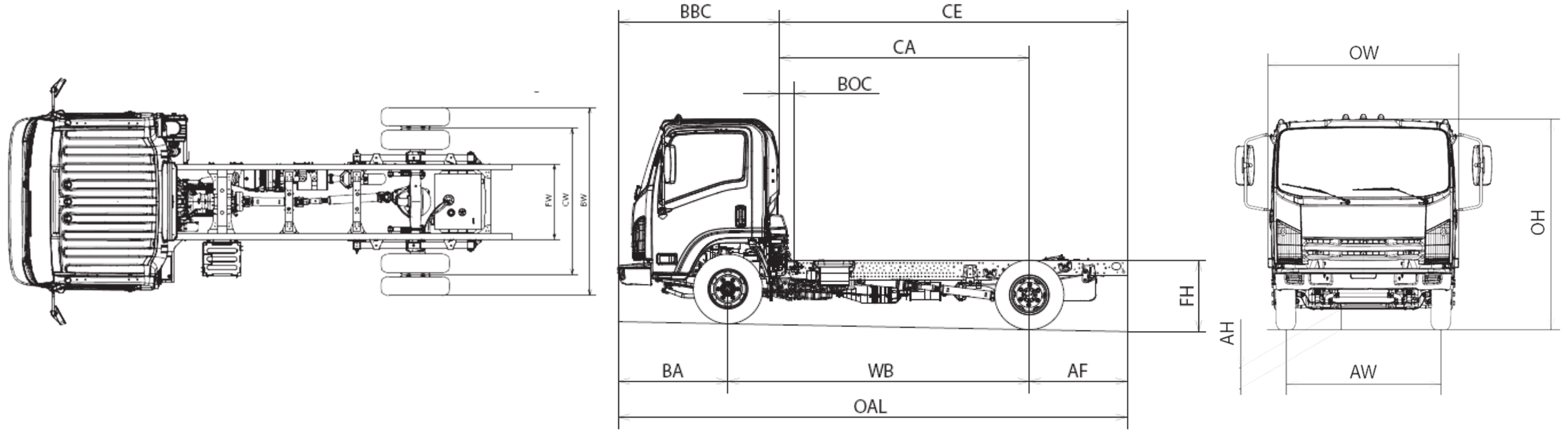
(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Model	NRR/W5500-HD
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in.^{3}, RBM 316,800 lbs.-ft./in. per rail.
Cab	All-steel, low cab forward, BBC 70.9in., 45° mechanical tilt with torsion assist.
Equipment	TRICOT woven breatheable cloth covered high back driver's seat with two-occupant passenger seat. Dual cab mounted exterior mirrors with integral convex mirrors.Tilt and telescoping steering column. Power windows & door locks, floor mats, tinted glass.
Electrical	12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110-amp alternator with integral regulator.
Options	AM/FM CD stereo radio, engine block heater, engine oil pan heater fuel tank mounted on right hand rail (33 gal), spare wheel, wheel simulators, air deflector, air conditioning, PTO enable switches, back up alarm, heated mirrors, hour meter, engine shutdown.

NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings



(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Variable Chassis Dimensions

Unit	WB^{+}	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

Dimension Constants

Code	Inches	Code	Inches	Code	Inches
AH	8.6	BW	83.3	FH	33.0
AW	65.6	CW	65.8		
BA	48.4	FW	33.5		
BBC	70.9	OH	91.1		
BOC	6.5	OW	78.5		

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

In-Frame Tank 19,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB+**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NU1	109 in.	lb.	3,997	2,319	6,316	13,184
NU2	132.5 in.	lb.	4,121	2,270	6,391	13,109
NU3	150 in.	lb.	4,186	2,242	6,428	13,072
NU4	176 in.	lb.	4,125	2,412	6,537	12,963

Side Mounted Tank 19,500-lb. GVWR Automaticl Transmission Model Chassis Cab and Maximum Payload Weights						
Model	**WB+**	**Unit**	**Front**	**Rear**	**Total**	**Payload**
NU1	109 in.	lb.	4,231	2,035	6,266	13,234
NU2	132.5 in.	lb.	4,310	2,032	6,342	13,158
NU3	150 in.	lb.	4,359	2,033	6,392	13,108
NU4	176 in.	lb.	4,419	2,035	6,454	13,046

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Truck Weight Limits:

GVWR Designed Maximum	19,500 lbs.
GAWR, Front	6,830 lbs.
GAWR, Rear	13,660 lbs.

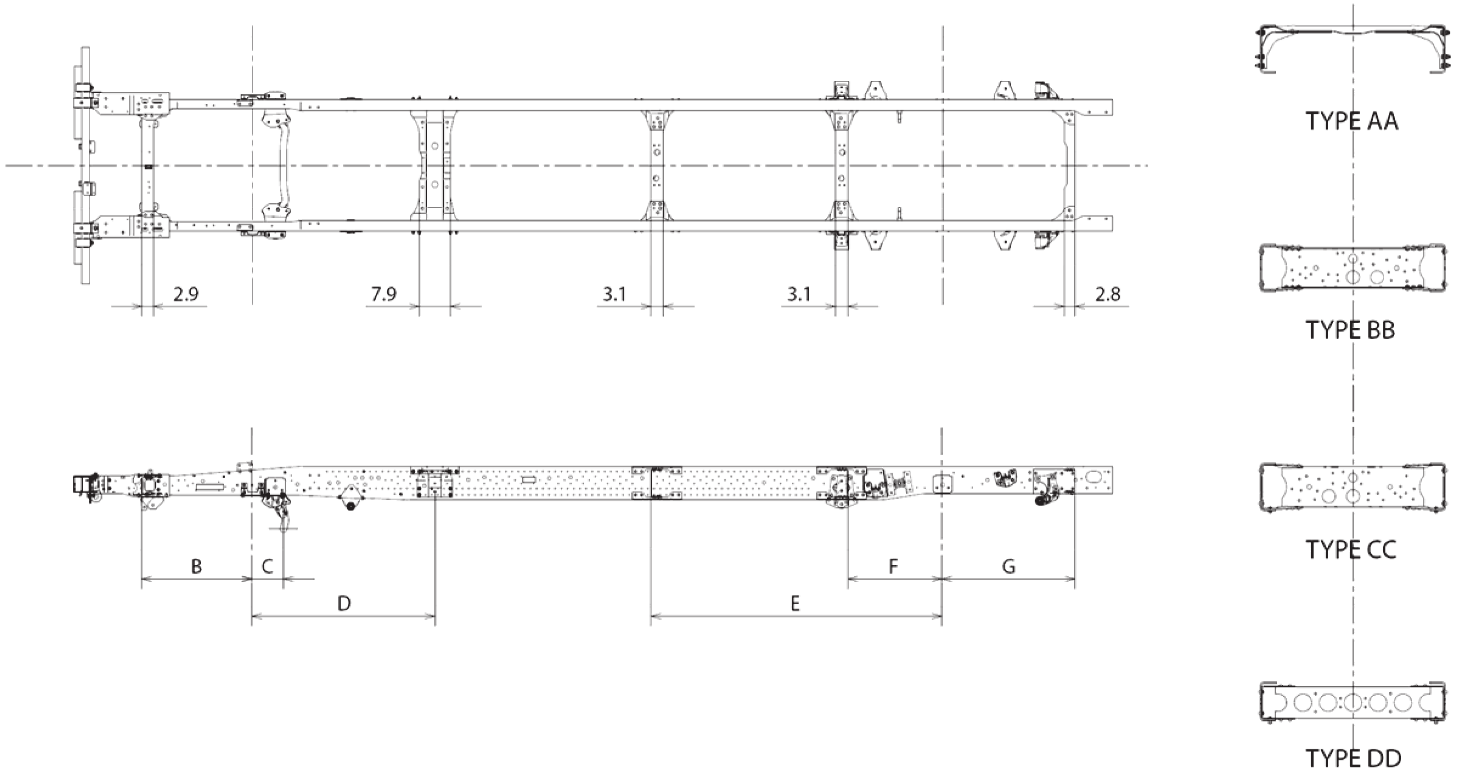
Technical Notes:

Chassis Curb Weight reflects standard equipment and fuel, but no driver or payload.

Maximum Payload Weight is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Frame and Crossmember Specifications

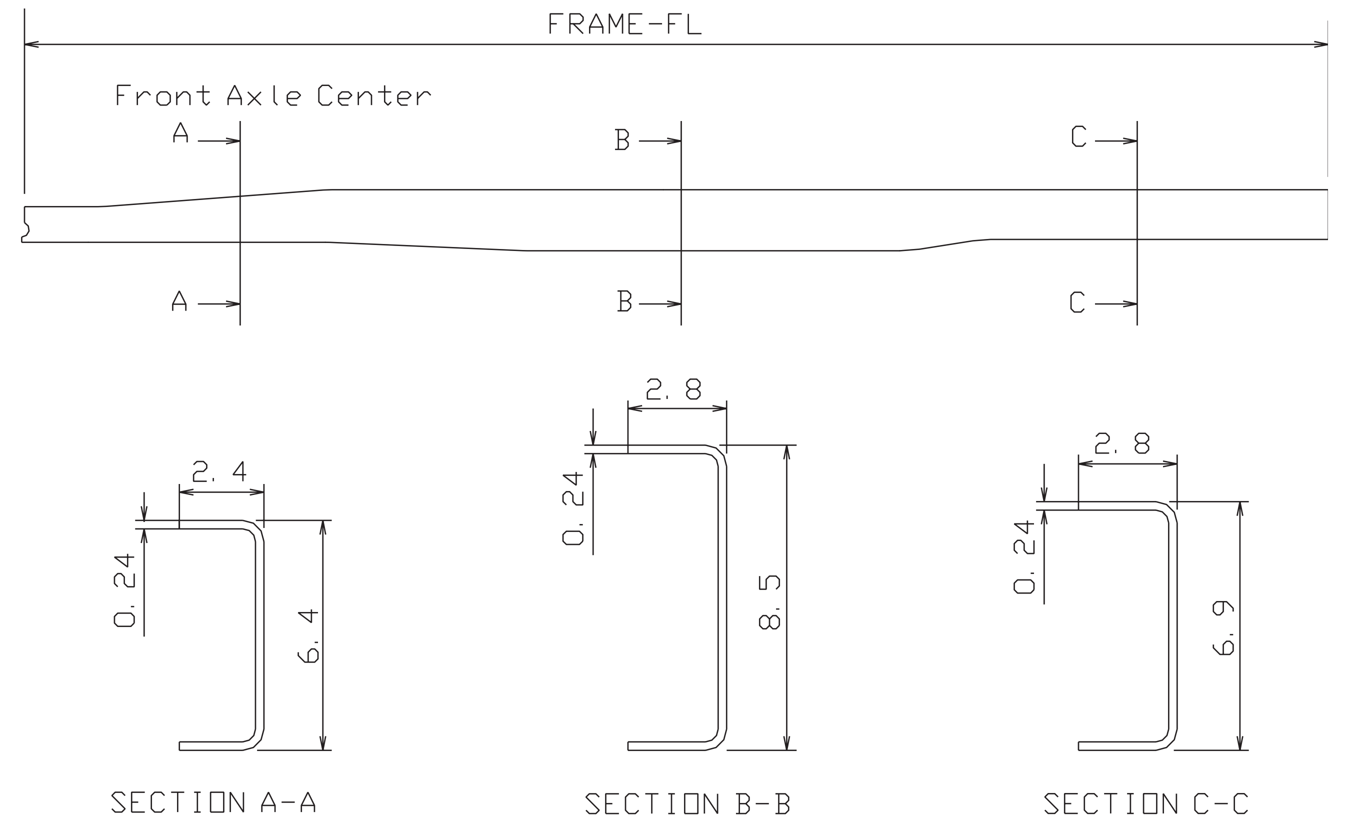


Wheelbase	Frame Thick	Crossmember Type/Location									
		B	C	D		E		F		G	
109.0	0.24	28.3	28.3	AA	46.5	–		CC	24.2	DD	33.8
132.5	0.24	28.3	28.3	AA	46.5	BB	57.5	CC	24.2	DD	33.8
150.0	0.24	28.3	28.3	AA	46.5	BB	57.9	CC	24.2	DD	33.8
176.0	0.24	28.3	28.3	AA	46.5	BB	74.4	CC	24.2	DD	33.8

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Frame Chart

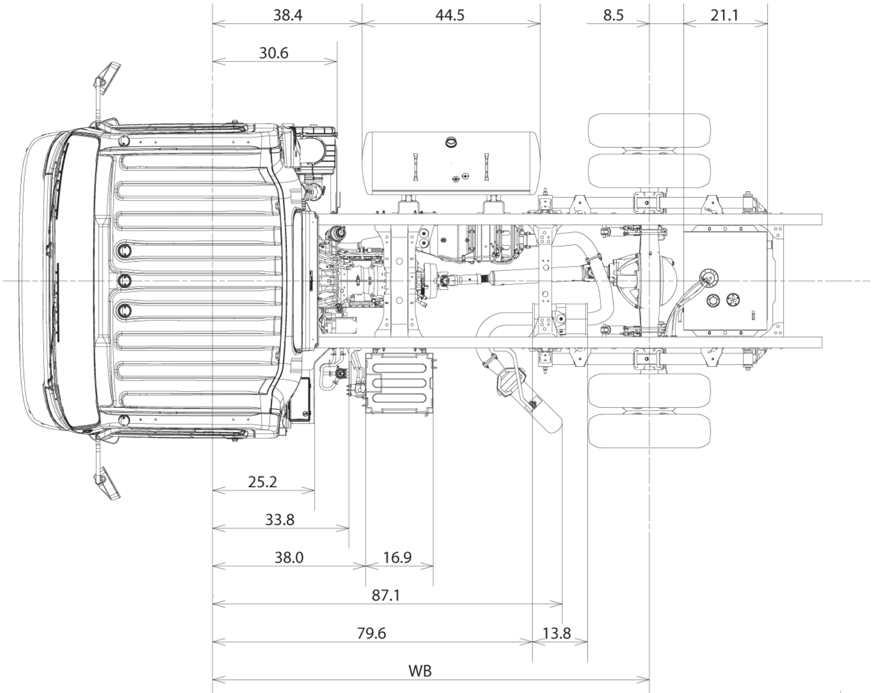

FRAME-FL
Front Axle Center
A
B
C
A
B
C
2.4
0.24
6.4
SECTION A-A
2.8
0.24
8.5
SECTION B-B
2.8
0.24
6.9
SECTION C-C

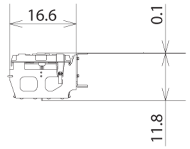
Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

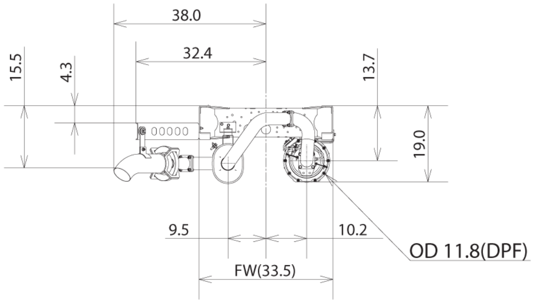
(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

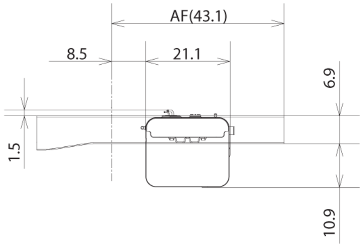
(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

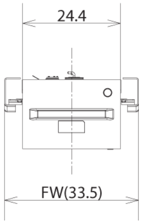
Auxiliary Views 109" Wheelbase

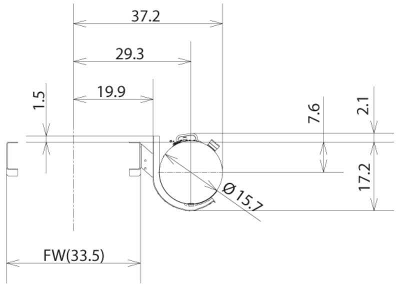

38.4
44.5
8.5
21.1
30.6
25.2
33.8
38.0
16.9
87.1
79.6
13.8
WB




38.0
32.4
15.5
4.3
13.7
19.0
9.5
10.2
OD 11.8(DPF)
FW(33.5)


AF(43.1)
8.5
21.1
6.9
1.5
10.9



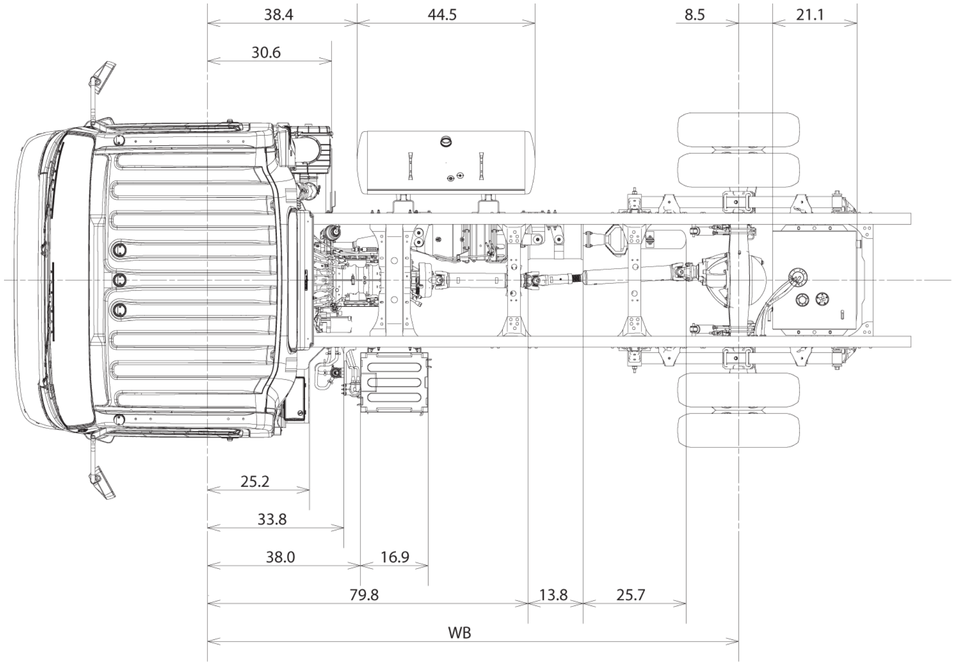

37.2
29.3
19.9
1.5
7.6
2.1
17.2
Ø15.7
FW(33.5)

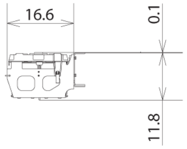
NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

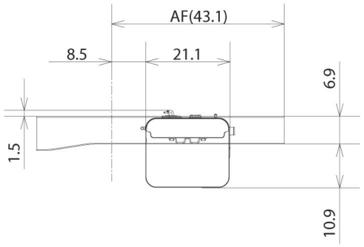
(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

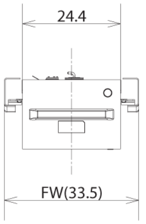
(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

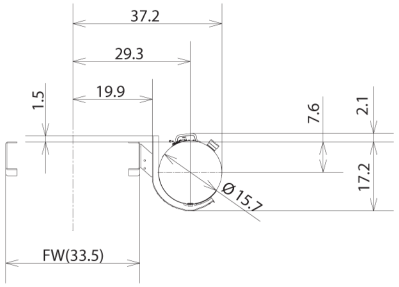
Auxiliary Views 132.5" Wheelbase

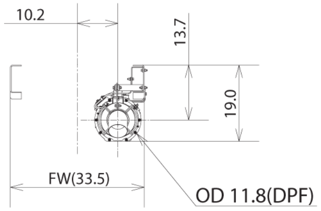

38.4
44.5
8.5
21.1
30.6
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB




AF(43.1)
8.5
21.1
6.9
1.5
10.9




37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)

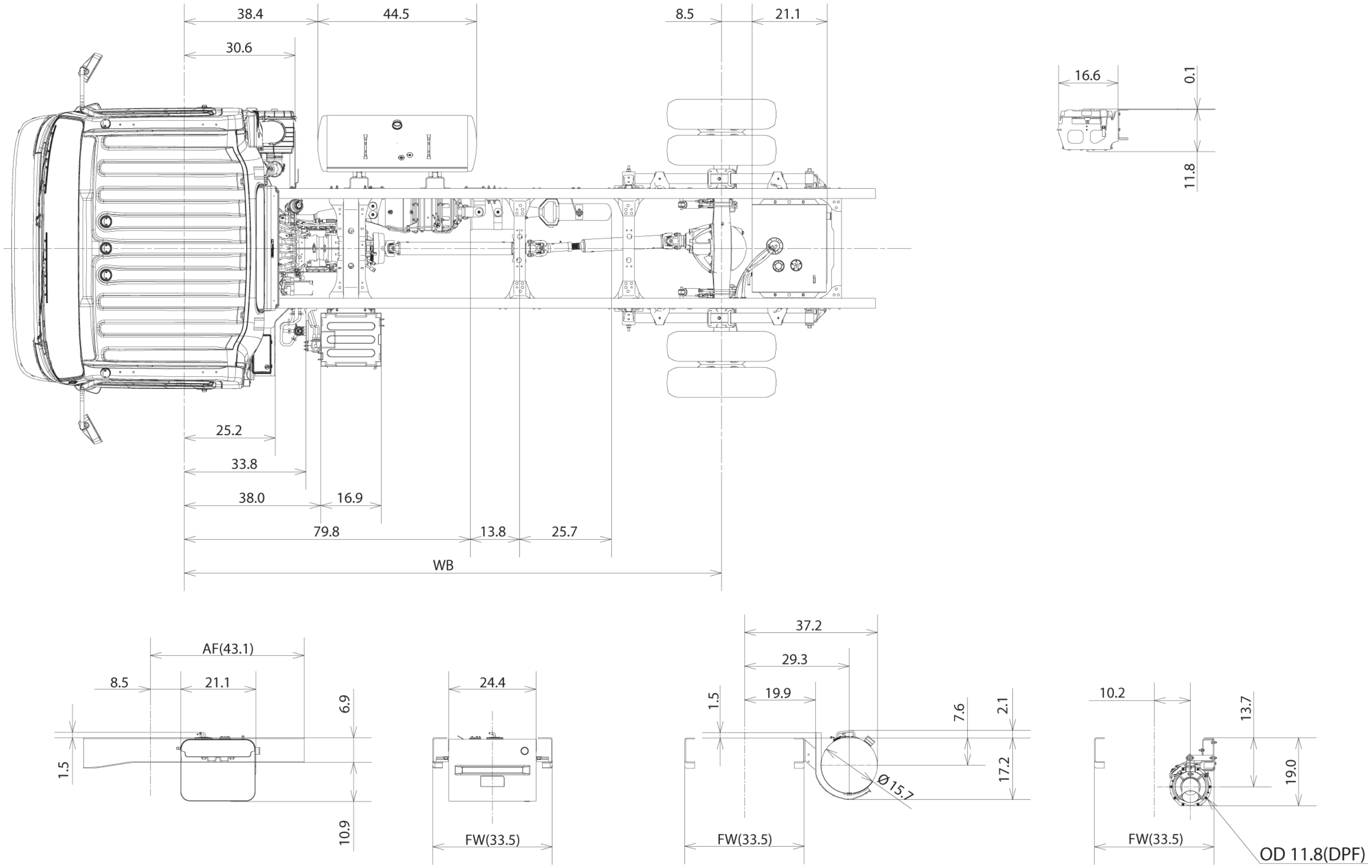

10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Auxiliary Views 150" Wheelbase

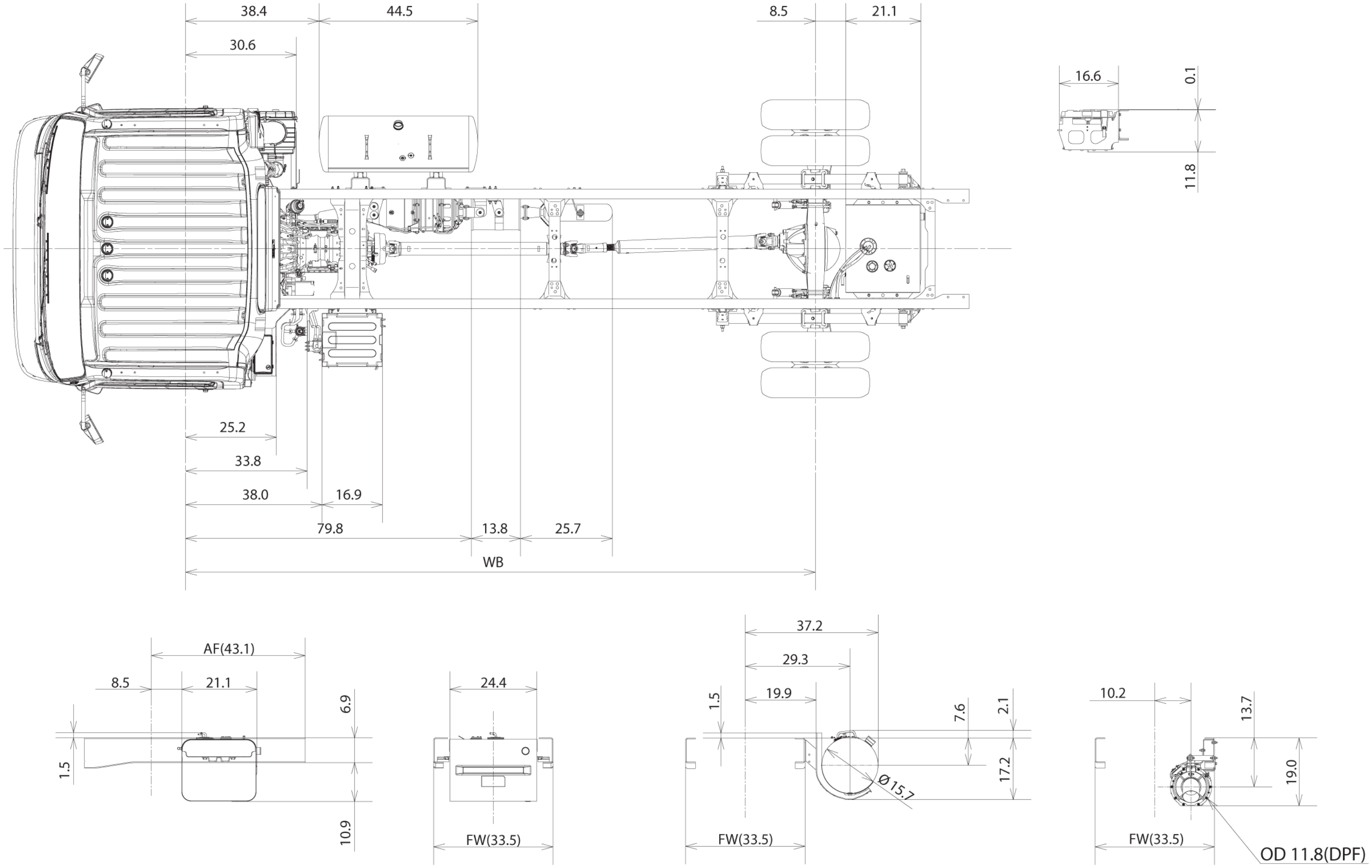

38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
37.2
AF(43.1)
29.3
8.5
21.1
24.4
19.9
1.5
10.2
6.9
7.6
2.1
13.7
1.5
Ø15.7
17.2
19.0
10.9
FW(33.5)
FW(33.5)
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Auxiliary Views 176" wheelbase



38.4
44.5
8.5
21.1
30.6
16.6
0.1
11.8
25.2
33.8
38.0
16.9
79.8
13.8
25.7
WB
AF(43.1)
8.5
21.1
6.9
1.5
10.9
24.4
FW(33.5)
37.2
29.3
1.5
19.9
7.6
2.1
17.2
Ø15.7
FW(33.5)
10.2
13.7
19.0
FW(33.5)
OD 11.8(DPF)

NOTE: Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.
* Allow 3" additional for battery box opening clearance.

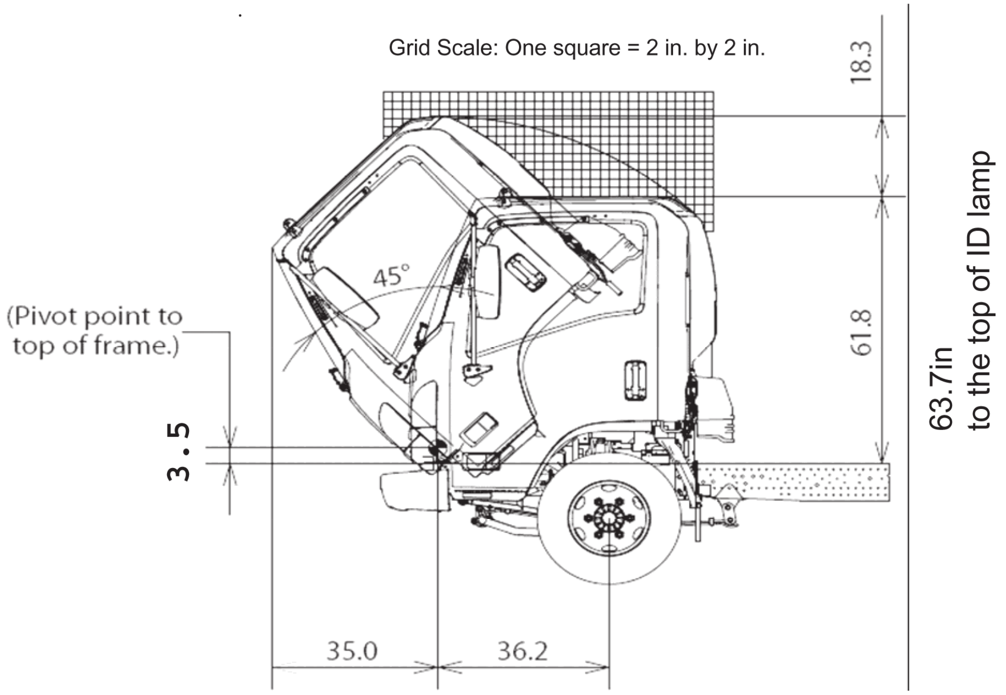
(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Body Builder Weight Information Chart

GVWR	Axle	Wheelbase								Unsprung Weight
		109 in.		132.5 in.		150 in.		176 in.		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
19,500	Front	3,997	4,231	4,121	4,310	4,186	4,359	4,125	4,419	661
	Rear	2,319	2,035	2,270	2,032	2,242	2,033	2,412	2,035	1,190
	Total	6,316	6,266	6,391	6,342	6,428	6,392	6,537	6,454	1,851

Cab Tilt


Grid Scale: One square = 2 in. by 2 in.
18.3
45°
(Pivot point to top of frame.)
61.8
63.7in to the top of ID lamp
3.5
35.0
36.2

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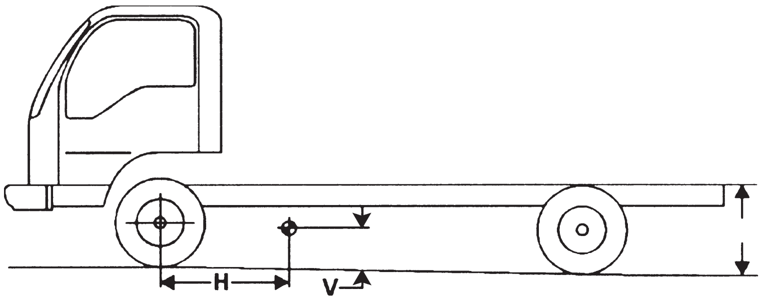
Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
19,500	109	24.9	40.0	35.4
	132.5	24.9	47.1	42.5
	150	24.9	52.3	47.7
	176	24.9	64.9	55.5



V = Vertical Center of Gravity
H = Horizontal Center of Gravity

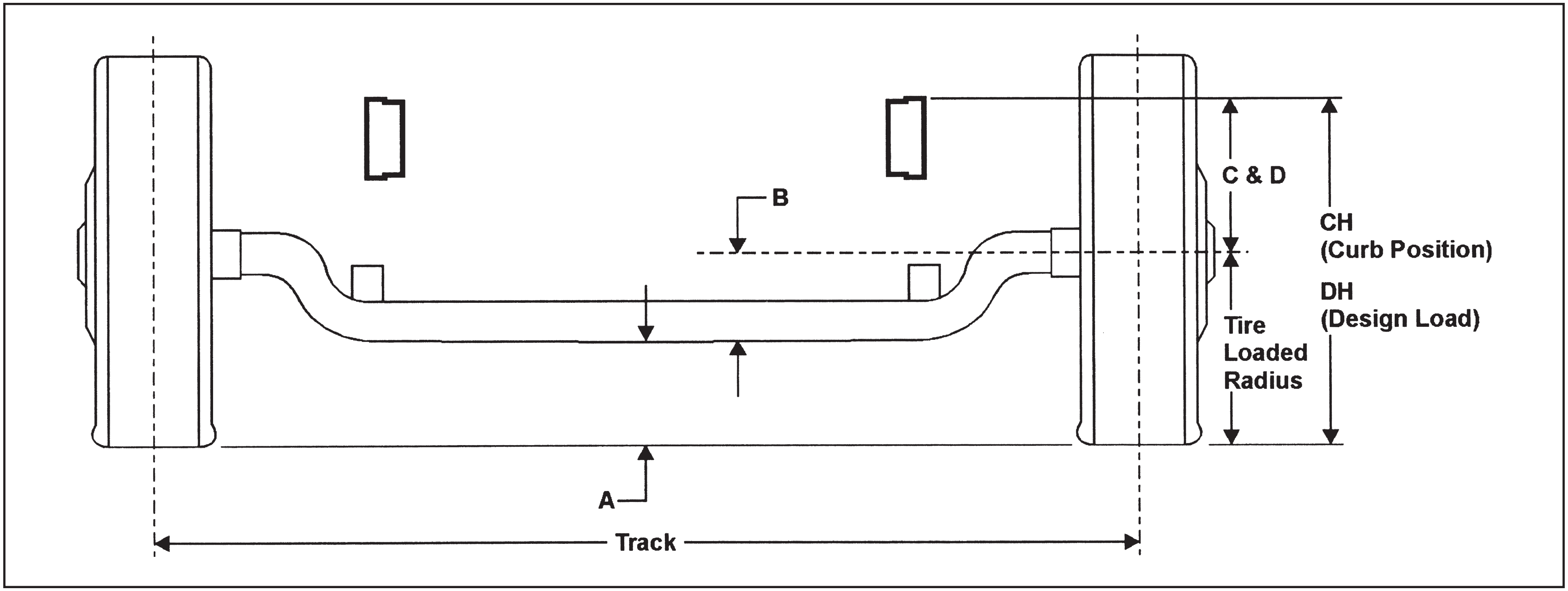
The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the **19,500 lb.** GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NRR/W5500-HD are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by GM/Isuzu Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-404-257-3013.

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Front Axle Chart



Formulas for calculating height dimensions:

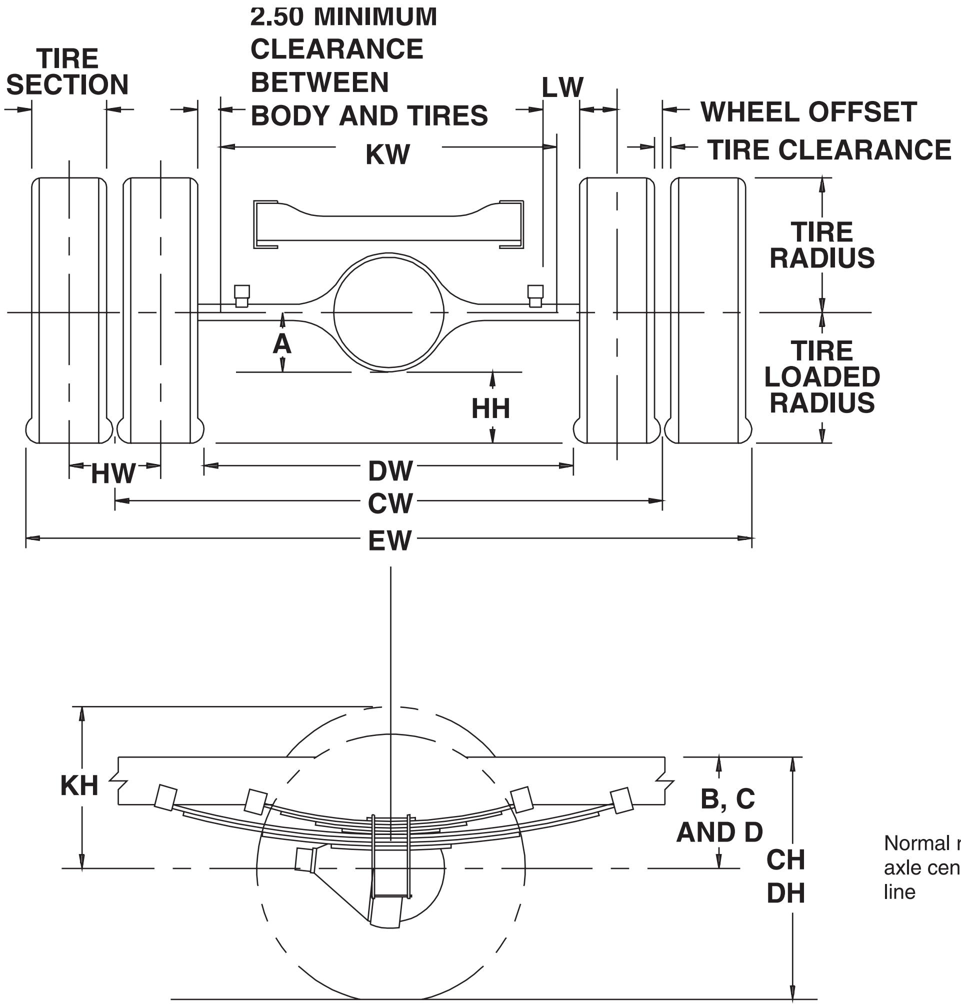
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

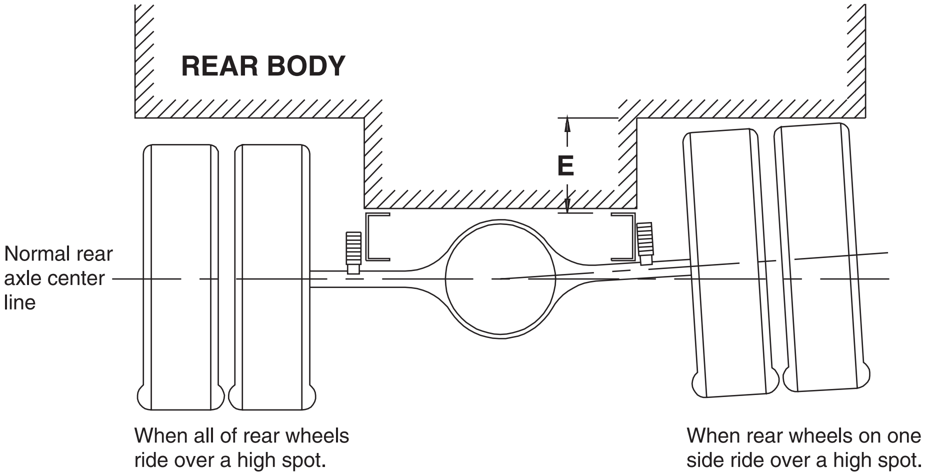
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	19,500 lbs.	6,830 lbs.	8.3	6.6	12.3	11.5	28.3	26.4	65.5	16	14.91

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Rear Axle Chart


2.50 MINIMUM
CLEARANCE
BETWEEN
BODY AND TIRES
TIRE
SECTION
LW
WHEEL OFFSET
TIRE CLEARANCE
KW
TIRE
RADIUS
A
HH
TIRE
LOADED
RADIUS
HW
DW
CW
EW
KH
B, C
AND D
CH
DH


REAR BODY
E
Normal rear
axle center
line
When all of rear wheels
ride over a high spot.
When rear wheels on one
side ride over a high spot.

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the tires in a set of dual tires.
		KH	Tire Bounce Clearance: Minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
	Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	12,980 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.6	13.4	8.4

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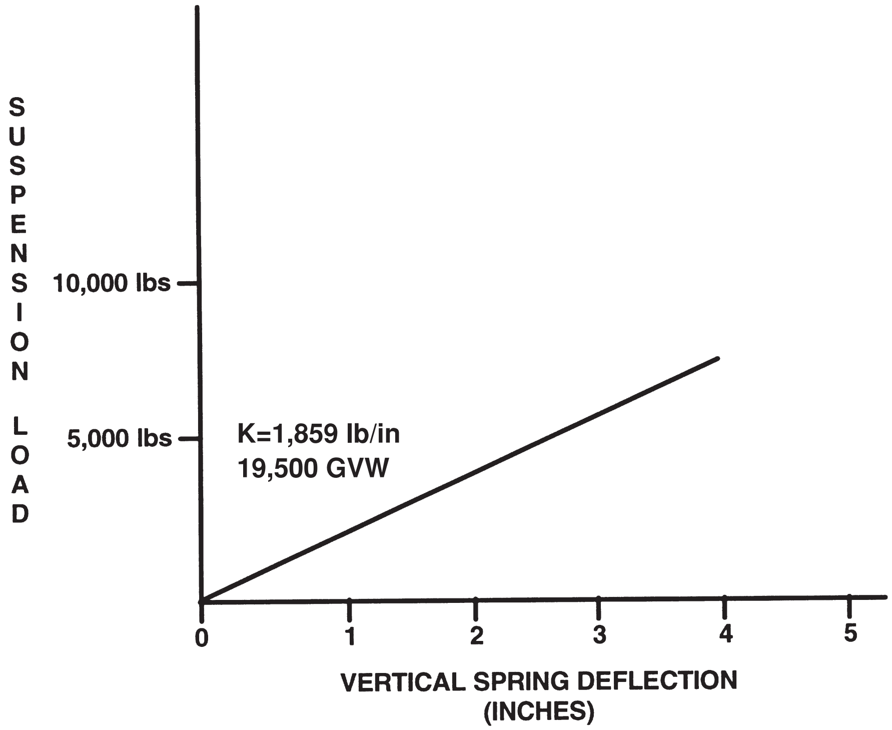
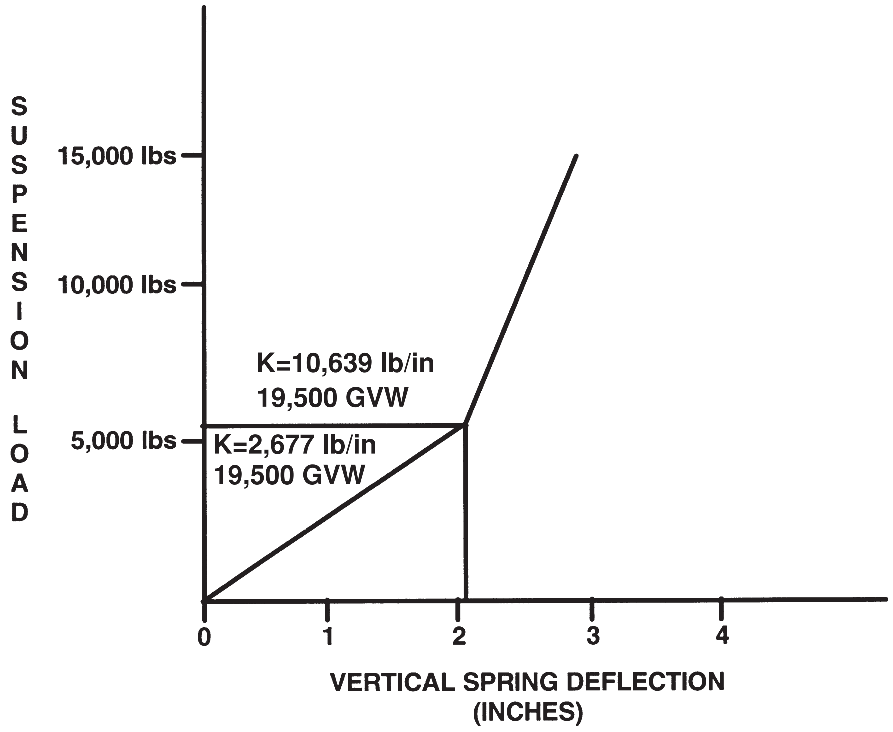
Suspension Deflection Charts

Front Leaf Spring Load vs. Deflection
(Per Axle)



Rear Leaf Spring Load vs. Deflection
(Per Axle)



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(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Tire and Disc Wheel Chart

Tire

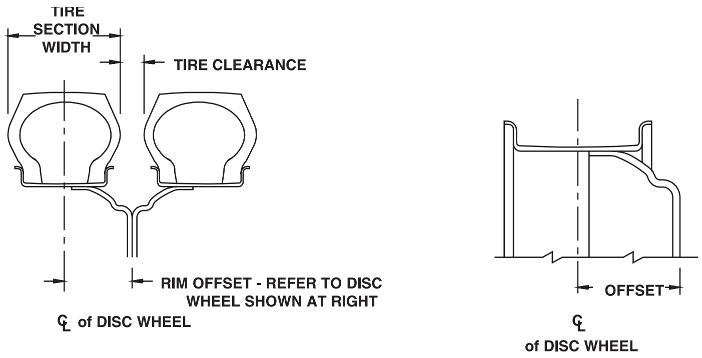
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,640	95	3,415	95	7,280	13,660	19,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	19,500	14.91	14.96	16.00	16.00	8.7	1.3	6.0

Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 RW	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	15º DC	Steel TOPY

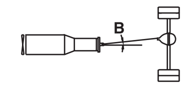
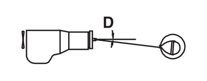
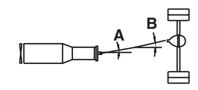
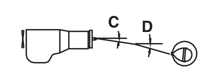
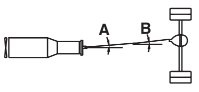
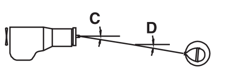
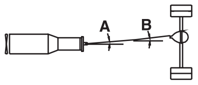
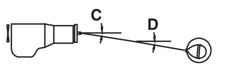
* O.D. Wrench Sizes


TIRE SECTION WIDTH
TIRE CLEARANCE
RIM OFFSET - REFER TO DISC WHEEL SHOWN AT RIGHT
℄ of DISC WHEEL
OFFSET
℄ of DISC WHEEL

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

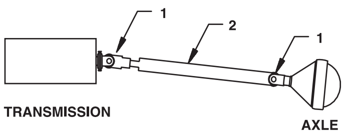
(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Propeller Shaft

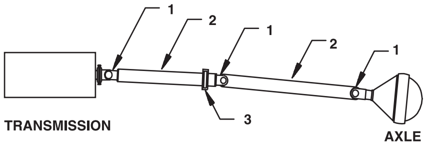
WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(109 in WB)



(132.5 in, 150 in and 176 in WB)



1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

Wheelbase	Plane View				Side View			
	A	A Auto. Trans.	B	B Auto. Trans.	C	C Auto. Trans.	D	D Auto. Trans.
109 in.		–		3.2º		–		8.5º
132.5 in.		0º		3.3º		2.6º		2.8º
150 in.		0º		3.3º		1.8º		1.9º
176 in.		0º		2.2º		0.4º		3.5º

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body)

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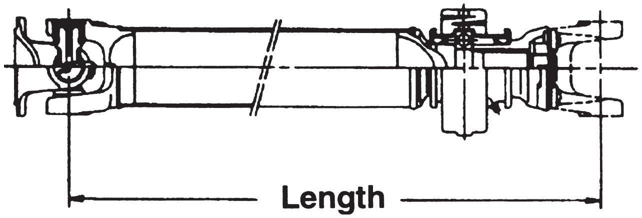
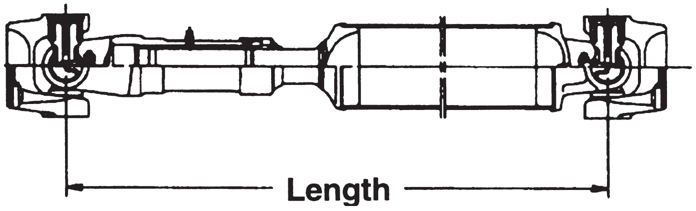
(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page

Wheelbase	**109**		**132.5**		**150**		**176**	
No. of Shafts	1		2		2		2	
Trans. Type		6 Auto. Trans.		6 Auto. Trans.		6 Auto. Trans.		6 Auto. Trans.
Shaft #1 O.D.		3.54		3.54		3.54		3.54
Thickness		0.126		0.126		0.126		0.126
Length		37.2		24.5		41.8		51.3
Type		B		A		A		A
Shaft #2 O.D.		N/A		3.54		3.54		3.54
Thickness		N/A		0.126		0.126		0.126
Length		N/A		36.1		36.4		52.9
Type		N/A		B		B		B

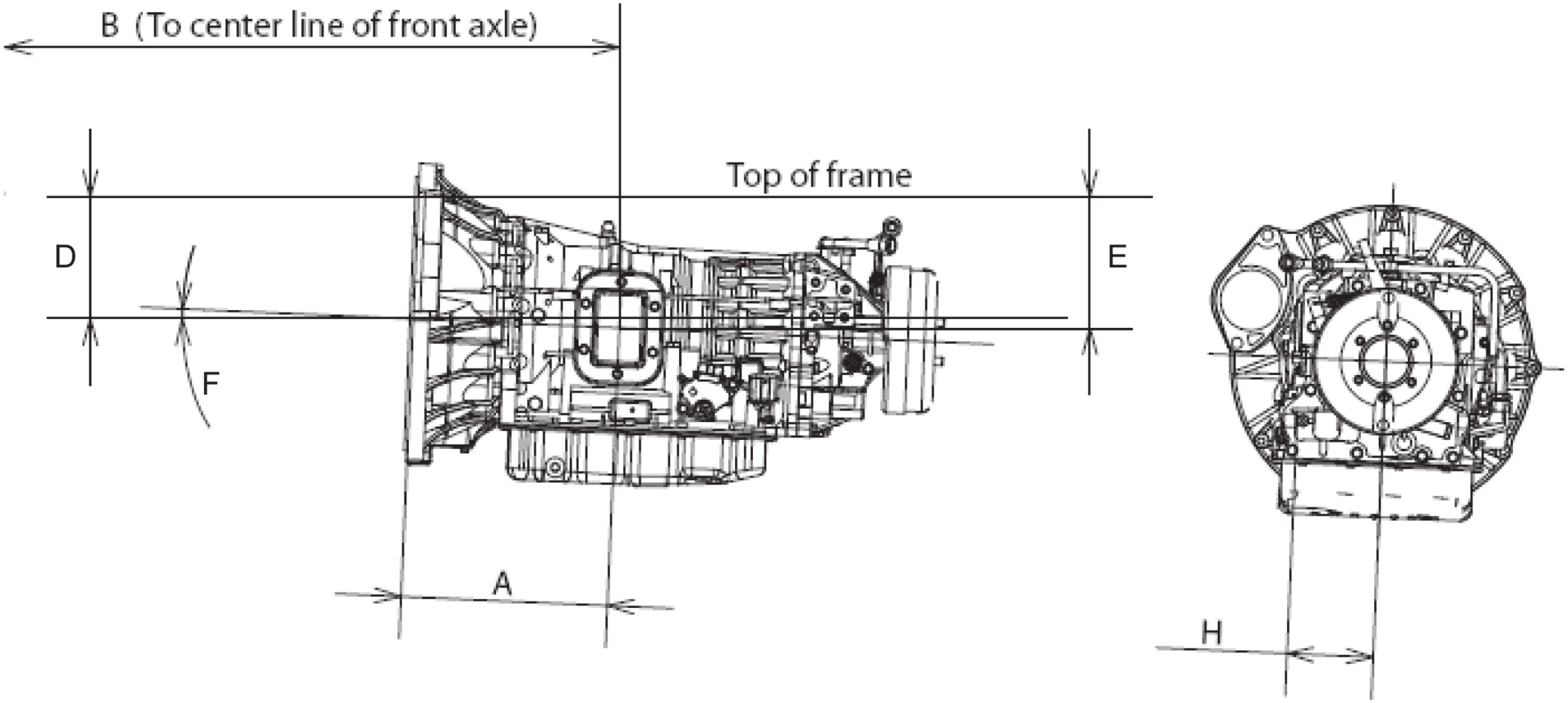
Type	**Description**	**Illustration**
Type **A**	1st shaft in 2-piece driveline	
Type **B**	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

PTO Location, Drive Gear and Opening Information

AUTOMATIC TRANSMISSION

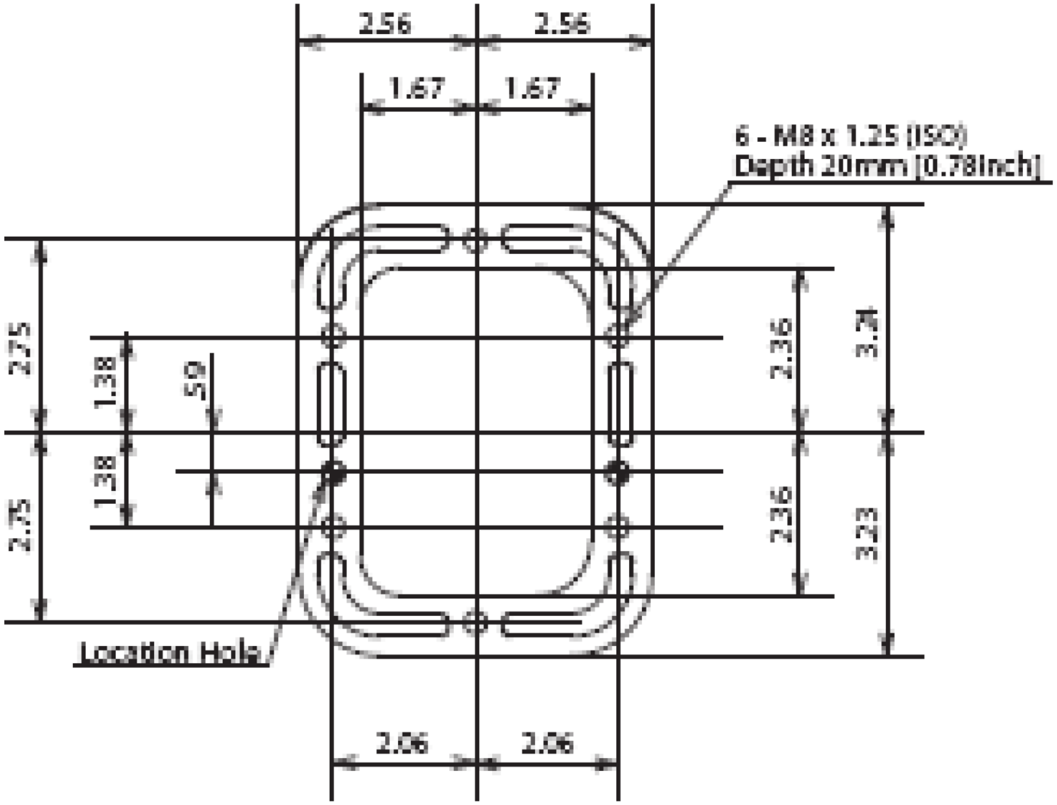

B (To center line of front axle)
Top of frame
D
E
F
A
H

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin[1)]	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5°	5.16	PTO Gear	1:1 with turbine	69	N/A	0°	134 lbs.-ft. @ 1,700 RPM

Opening Diagram

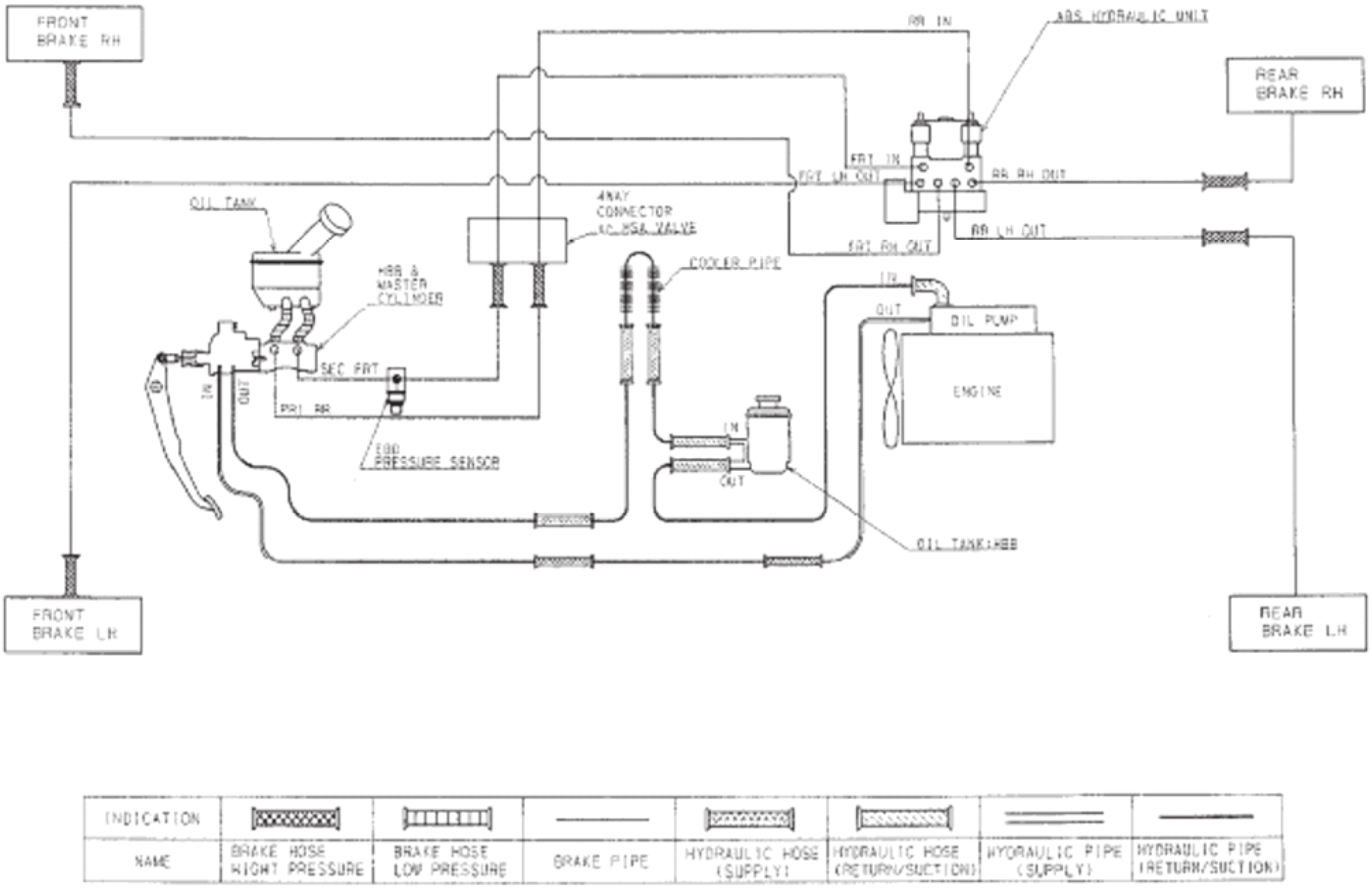

2.56
2.56
1.67
1.67
6 - M8 x 1.25 (ISO)
Depth 20mm [0.78Inch]
2.75
2.75
1.38
1.38
.59
2.36
2.36
3.24
3.23
Location Hole
2.06
2.06

(Vehicle Specifications Index Section – NRR/W5500-HD – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD – continued from previous page)

Brake System Diagram, Hydraulic Brake Booster

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.


FRONT BRAKE RH
RR IN
ABS HYDRAULIC UNIT
REAR BRAKE RH
FRT IN
FRT LH OUT
RR RH OUT
4WAY CONNECTOR
W/ HSA VALVE
OIL TANK
RR LH OUT
FRT RH OUT
COOLER PIPE
HBB & MASTER CYLINDER
IN
OUT
OIL PUMP
SEC FRT
IN
OUT
ENGINE
PRI RR
IN
OUT
EBD PRESSURE SENSOR
OIL TANK:HBB
FRONT BRAKE LH
REAR BRAKE LH
INDICATION
NAME
BRAKE HOSE HIGHT PRESSURE
BRAKE HOSE LOW PRESSURE
BRAKE PIPE
HYDRAULIC HOSE (SUPPLY)
HYDRAULIC HOSE (RETURN/SUCTION)
HYDRAULIC PIPE (SUPPLY)
HYDRAULIC PIPE (RETURN/SUCTION)

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(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Diesel Fuel Fill

Installation Instructions

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver's side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

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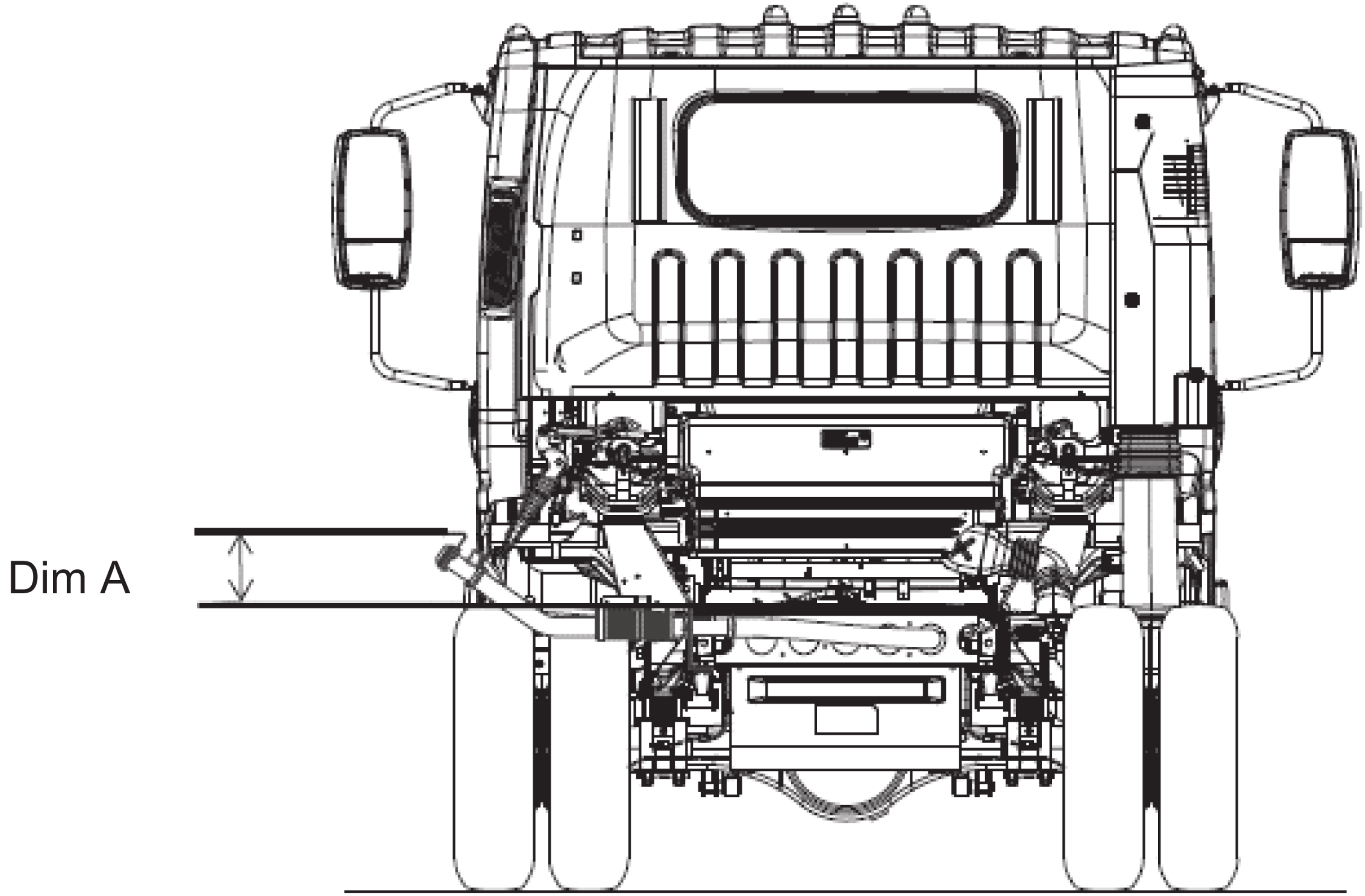
(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Rear View Fuel Fill

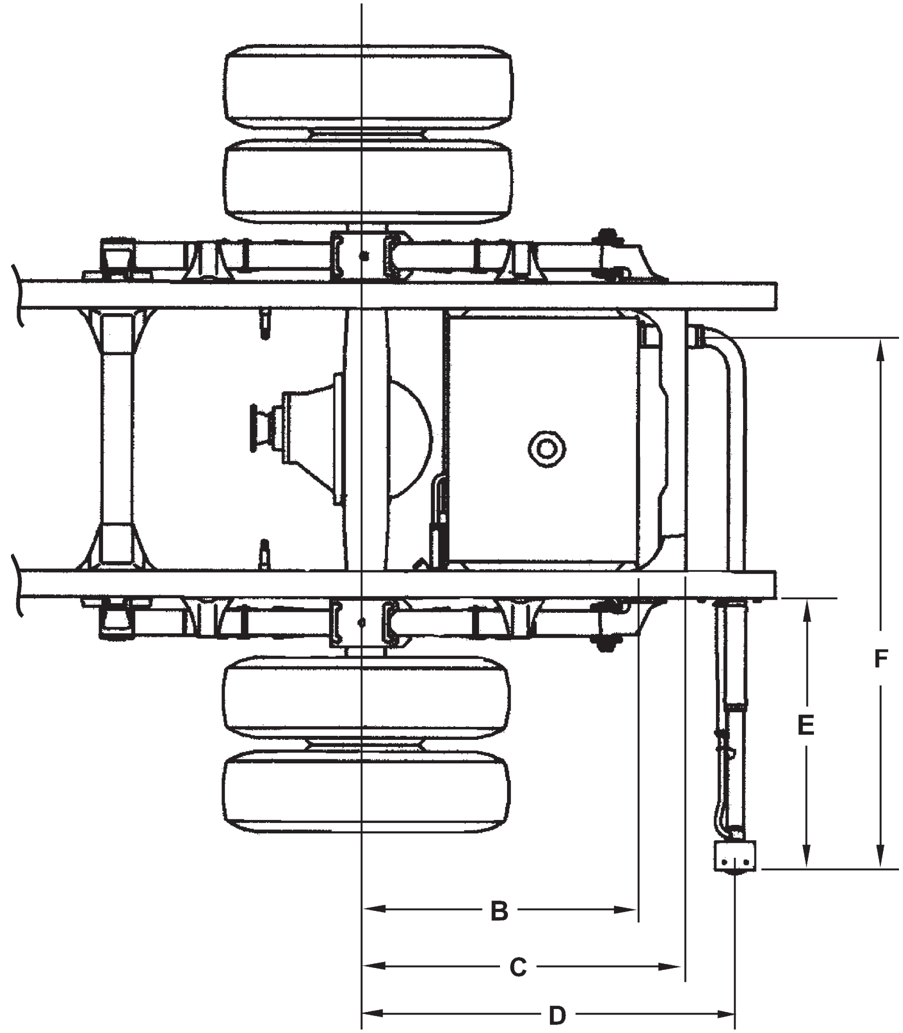


Dimension A = 6.85-8.5 inches (174-216 mm)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

Top View Fuel Fill

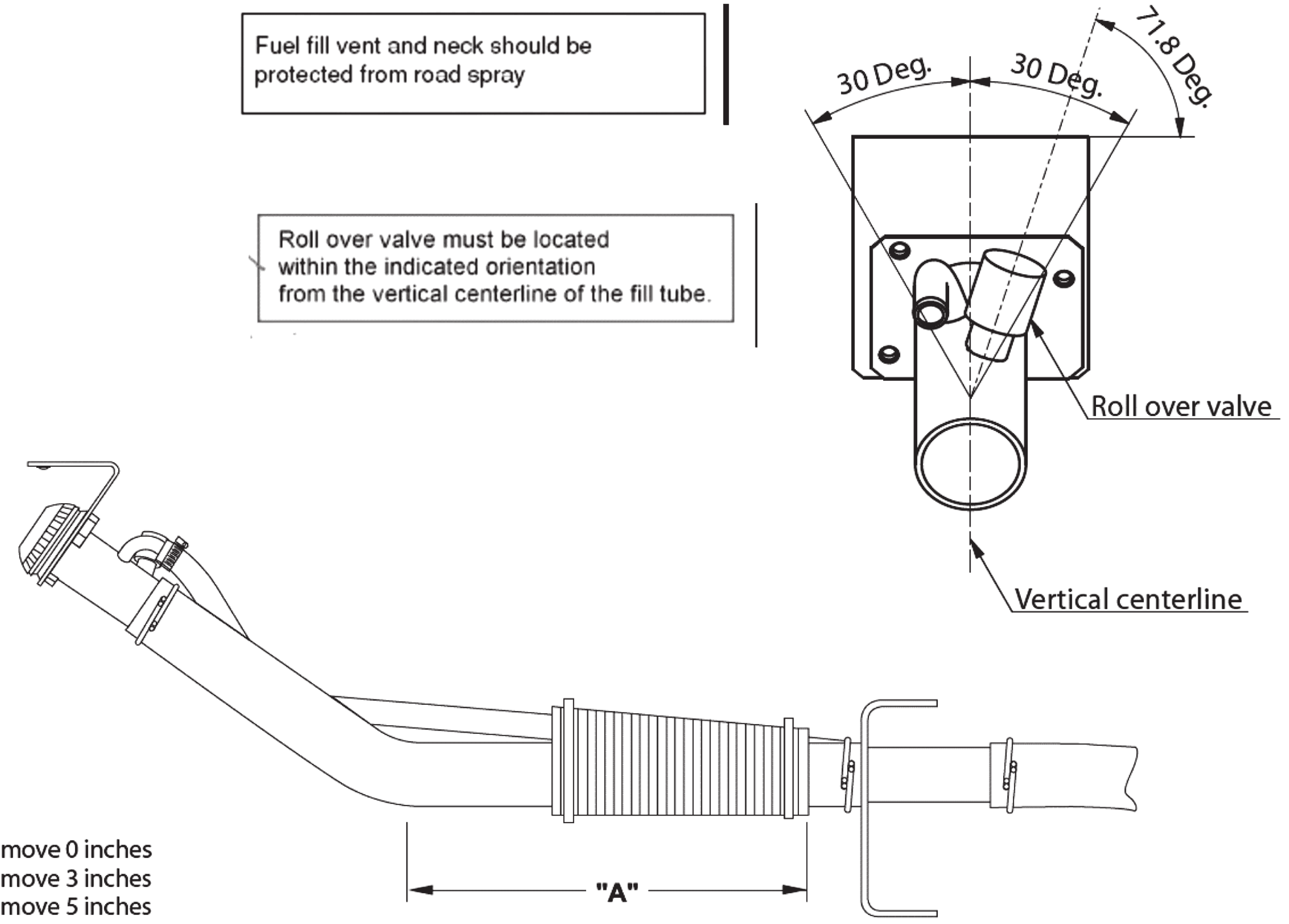


Dimensions:
B = 29.75 inches (756 mm)
C = 34.00 inches (863 mm)
D = 39.29 inches (998 mm)
E = 33.86 inches (860 mm)
F = 59.60 inches (1,514mm)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



Fuel fill vent and neck should be protected from road spray

Roll over valve must be located within the indicated orientation from the vertical centerline of the fill tube.

102 remove 0 inches
96 remove 3 inches
90 remove 5 inches
86 remove 8 inches
80 remove 8 inches

NOTE: Shorten Hose at "A" Area only.

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued on next page)

(Vehicle Specifications Index Section – NQR/W5500 Diesel – continued from previous page)

Ultra Low Sulfur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),
The decal illustrated below must be installed on the vehicle.
The decal is included in the fuel fill parts box.

Ultra Low Sulfur
Diesel Fuel Only

N' utiliser que
du carburant
diesel a teneur
ultra-faible
en soufre

INSTRUCTIONS FOR DECAL PLACEMENT:

1. The decal must be placed as close as possible to the fuel inlet and be **clearly visible.**
2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
4. For installed bodies that have a fuel door , the decal should be placed above or to the side of the fuel door.

Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

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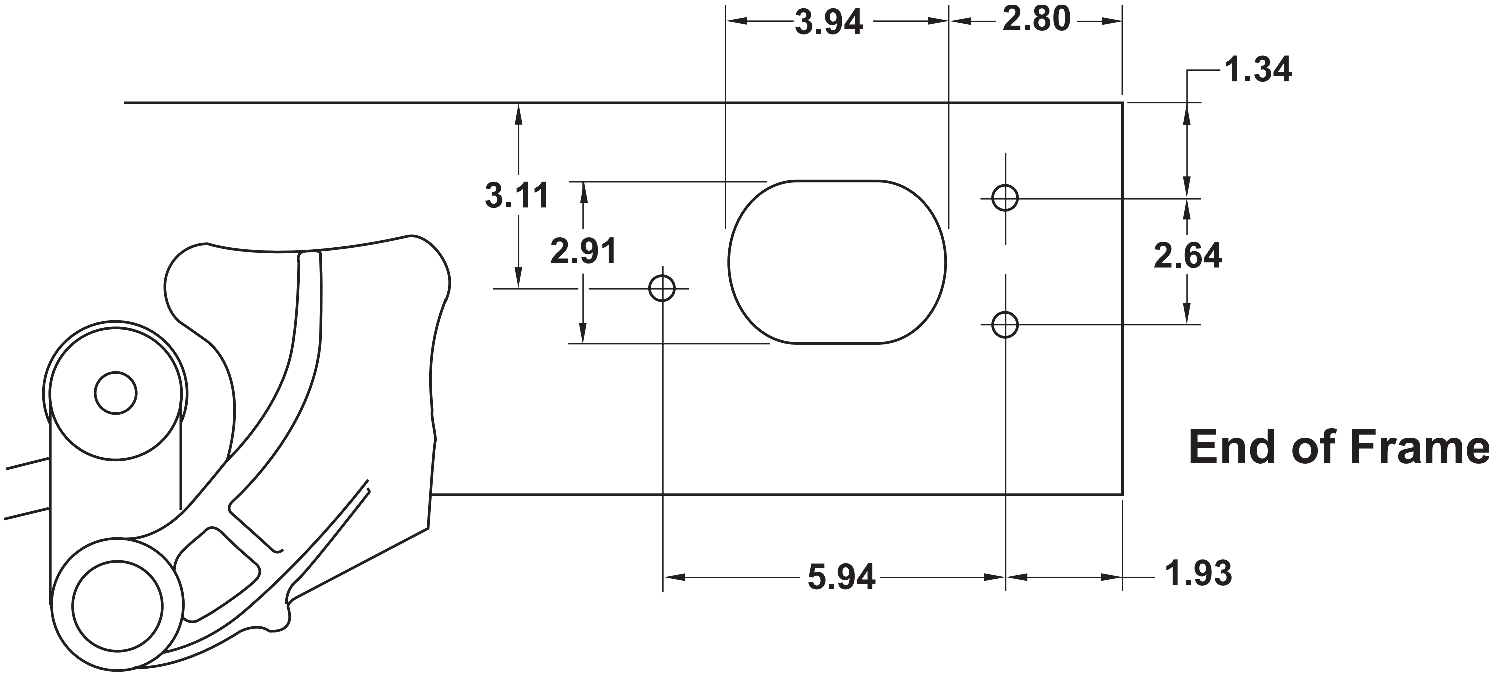
(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

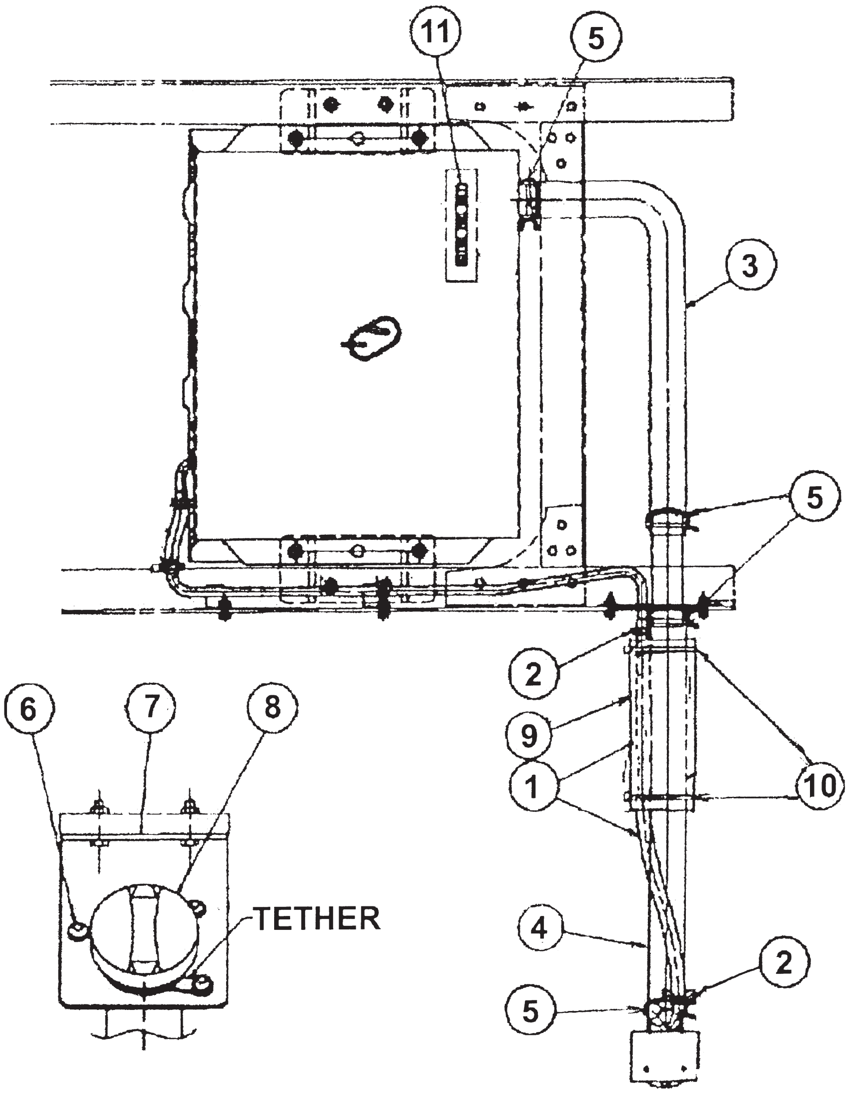
Through the Rail Fuel Fill Frame Hole


3.94
2.80
1.34
3.11
2.91
2.64
End of Frame
5.94
1.93

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued on next page)

(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

NRR/W5500-HD Diesel Fuel Fill Parts Illustration



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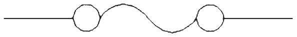
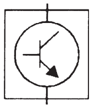
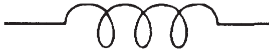
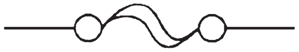
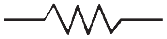
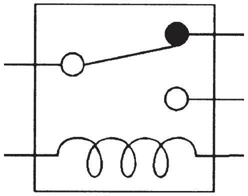
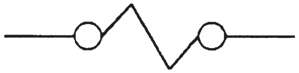
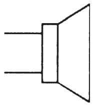
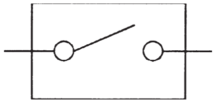
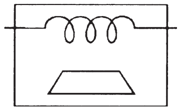
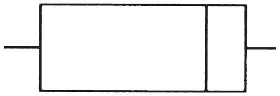
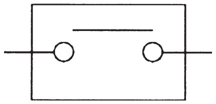
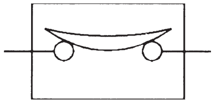
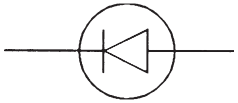
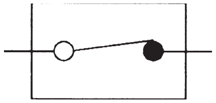
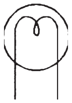
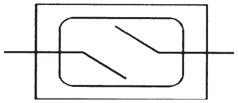
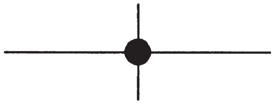
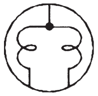
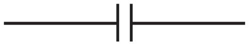
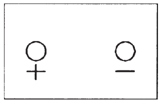
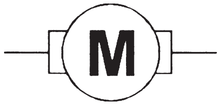
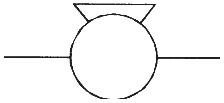
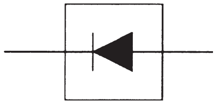
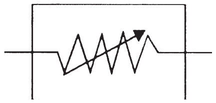
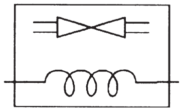
(Vehicle Specifications Index Section – NRR/W5500-HD Diesel – continued from previous page)

NRR/W5500-HD Diesel Fuel Fill Parts List

Number	Part Name	Isuzu Part Number	GM Part Number	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1071	94062296	2
11	Caution Plate	N/A	15798339	1

NPR/W3500, NPR HD/W4500 Gas Electrical

Symbols

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Fuse		Electronic Parts		Coil (Inductor), Solenoid Magnetic Valve
	Fusible Link		Resistor		Relay
	Fusible Link Wire		Speaker		
	Switch		Buzzer		Connector
	Switch		Circuit Breaker		Light-Emitting Diode
	Switch (Normal Close Type)		Bulb		Reed Switch
	Contact Wiring		Double-Filament Bulb		Condenser
	Battery		Motor		Horn
	Diode		Variable Resistor Rheostat		Vacuum Switching Valve

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(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

Abbreviations

Abbreviation	Definition	Abbreviation	Definition
3A/T	6-Speed Automatic Transmission	IG	Ignition
4A/T	4-Speed Automatic Transmission	kW	kilowatt
A/T	Automatic Transmission	LH	Left hand
ABS	Anti-lock brake system	LO	Low
APP	Accelerator pedal position	LWB	Long wheelbase
ATF	Automatic Transmission Fluid	M/T	Manual Transmission
AUTO	Automatic	M/V	Magnetic valve
BRKT	Bracket	MAF	Mass airflow
C/B	Circuit breaker	MIL	Check engine light
CKP	Crankshaft position	OD	Over drive
CMP	Camshaft position	OPT	Option
COMB	Combination	PTO	Power Take Off
CONT	Control	RH	Right hand
D.R.L.	Day time running light	RR	Rear
DC	Direct current	SCV	Suction control valve
ECM	Electronic control module	ST	Start
ECT	Engine coolant temperature	STD	Standard
ECU	Electronic control unit	SW	Switch
EGR	Exhaust gas reticulation	SWB	Short wheelbase
EHCU	Electronic and hydraulic control unit	TCM	Transmission control module
FL	Fusible link	V	Volt
FRT	Front	VSV	Vacuum switching valve
FT	Fuel Temperature	W	Watt (S)
H/L	Headlight	W/	With
HI	High	W/O	Without
IAT	Intake air temperature	W/S	Weld splice
IC	Integrated circuit	WOT	Wide-open throttle

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Wiring

Wire Color

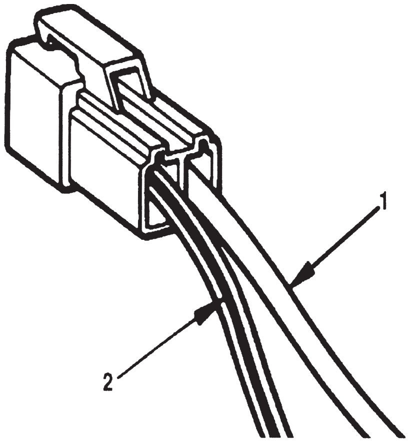
All wires have color-coded insulation. Wires belonging to a system's main harness will have a single color. Wires belonging to a system's sub-circuits will have a colored stripe. Striped wires use the following code to show wire size and colors.

Example: 0.5 G / R

Red (Stripe Color)

Green (Base Color)

Wire Size (0.5 mm^2)



1. Single Color Wire
2. Colored Stripe Wire

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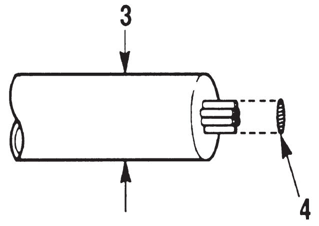
Abbreviations are used to indicate wire color within a circuit diagram. Refer to the following table.

Color-Coding	Meaning	Color-Coding	Meaning
B	Black	BR	Brown
W	White	LG	Light Green
R	Red	GR	Grey
G	Green	P	Pink
Y	Yellow	LB	Light Blue
L	Blue	V	Violet
O	Orange		

Wire Size

The size of wire used in a circuit is determined by the amount of current (amperage), the length of the circuit, and the voltage drop allowed. The following wire size and load capacity are specified by AWG (American Wire Gauge). (Nominal size means approximate cross sectional area.)

3. Outside Diameter
4. Cross Sectional Area



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(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

Nominal Size	Cross Sectional Area (mm^2)	Outside Diameter (mm)	Allowable Current (A)	AWG Size (Cross reference)
0.3	0.372	1.8	9	22
0.5	0.563	2.0	12	20
0.85	0.885	2.2	16	18
1.25	1.287	2.5	21	16
2	2.091	2.9	28	14
3	3.296	3.6	37.5	12
5	5.227	4.4	53	10
8	7.952	5.5	67	8
15	13.36	7.0	75	6
20	20.61	8.2	97	4

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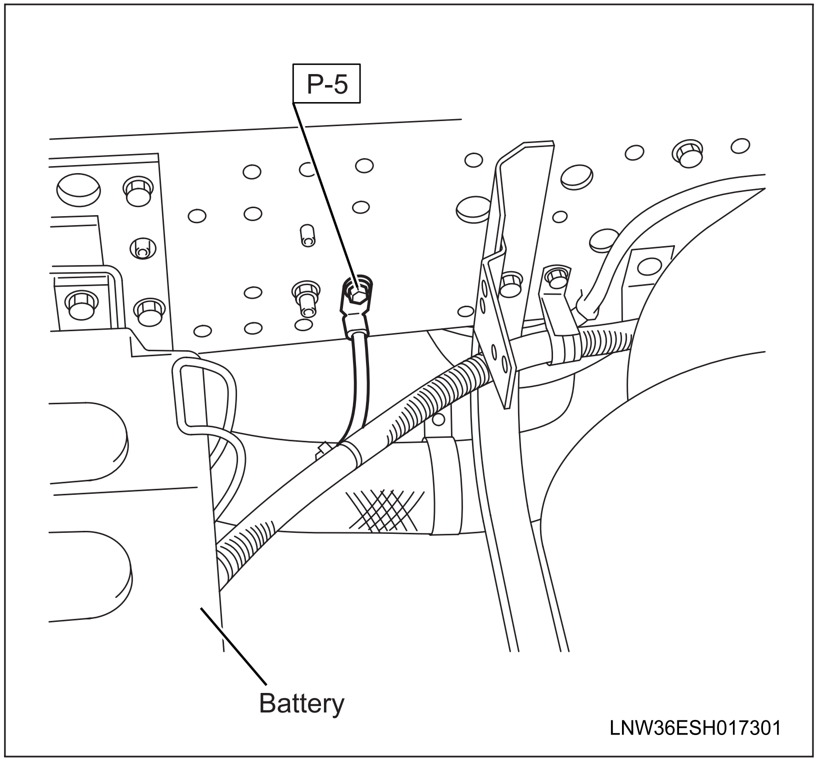
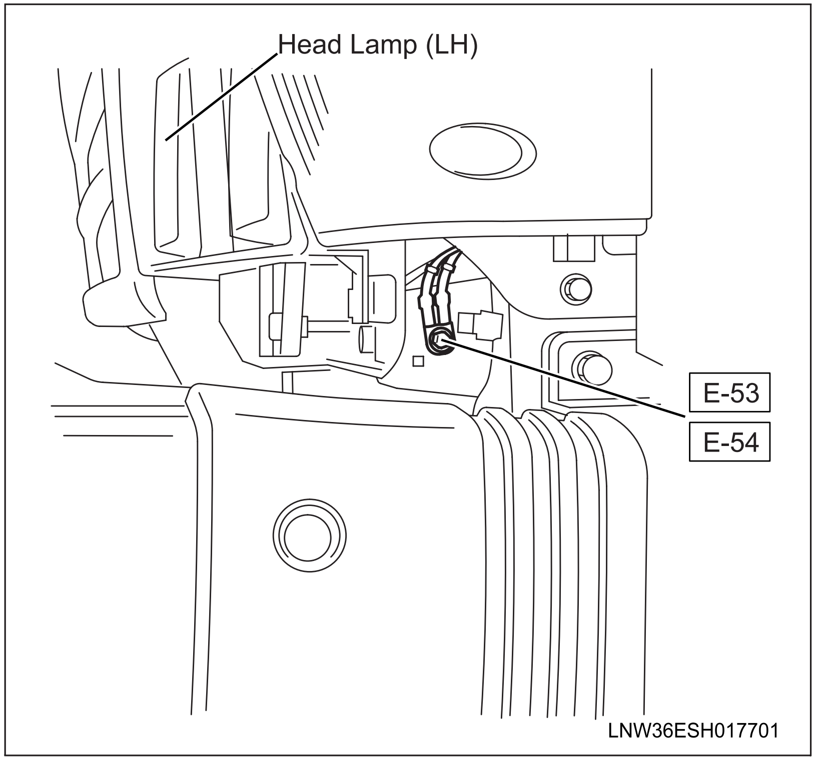
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

Grounding Point Location

P-5


P-5
Battery
LNW36ESH017301

E-53, E-54


Head Lamp (LH)
E-53
E-54
LNW36ESH017701

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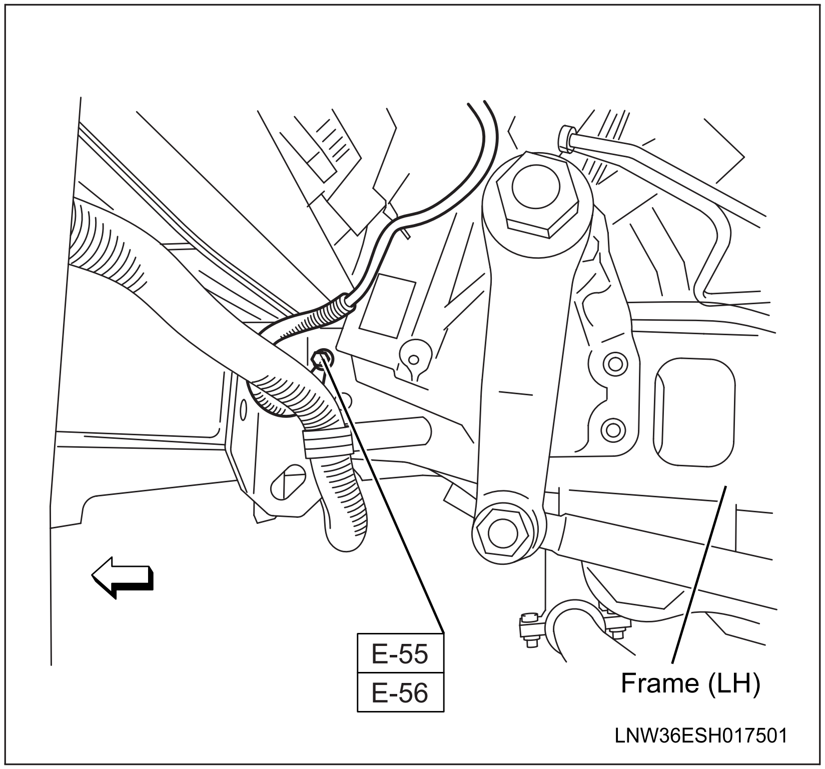
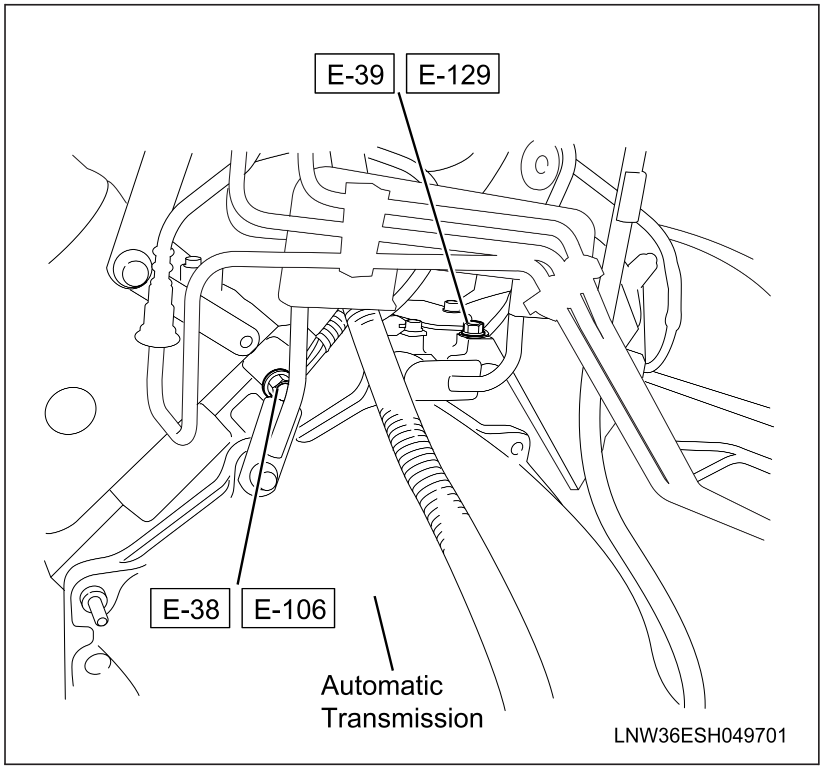
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

Grounding Point Location

E-55, E-56


E-55
E-56
Frame (LH)
LNW36ESH017501

E-38, E-106, E-39, E-129


E-39
E-129
E-38
E-106
Automatic Transmission
LNW36ESH049701

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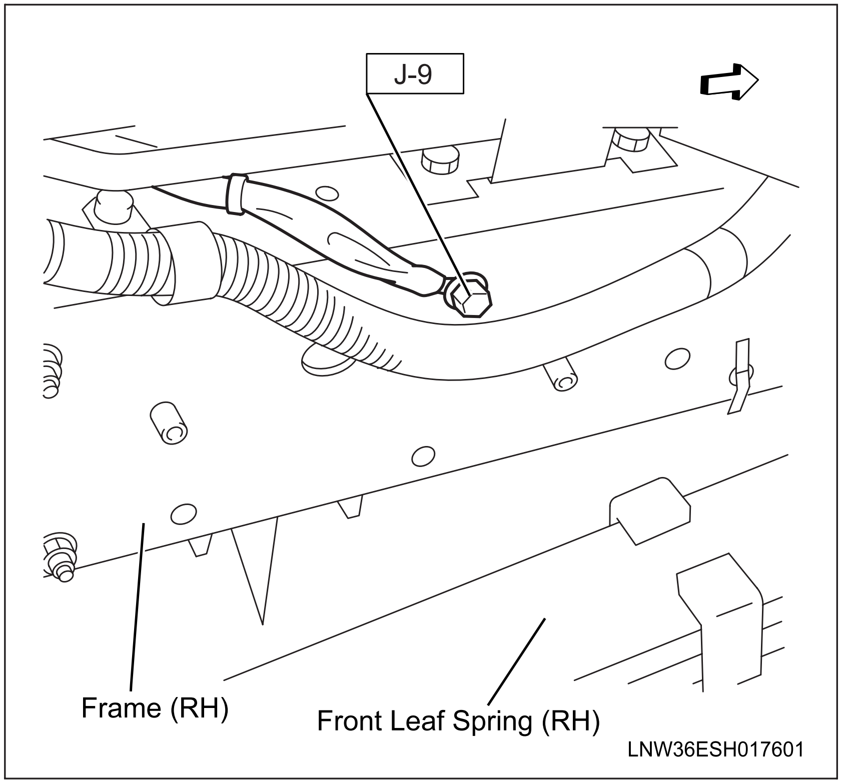
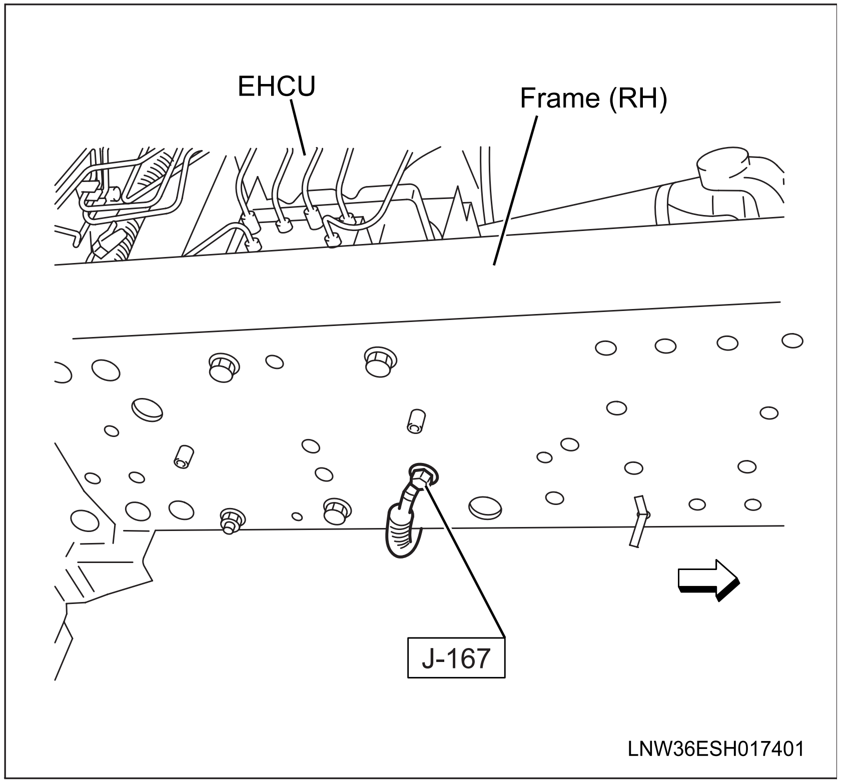
Grounding Point Location

J-9


J-9
Frame (RH)
Front Leaf Spring (RH)
LNW36ESH017601

J-167


EHCU
Frame (RH)
J-167
LNW36ESH017401

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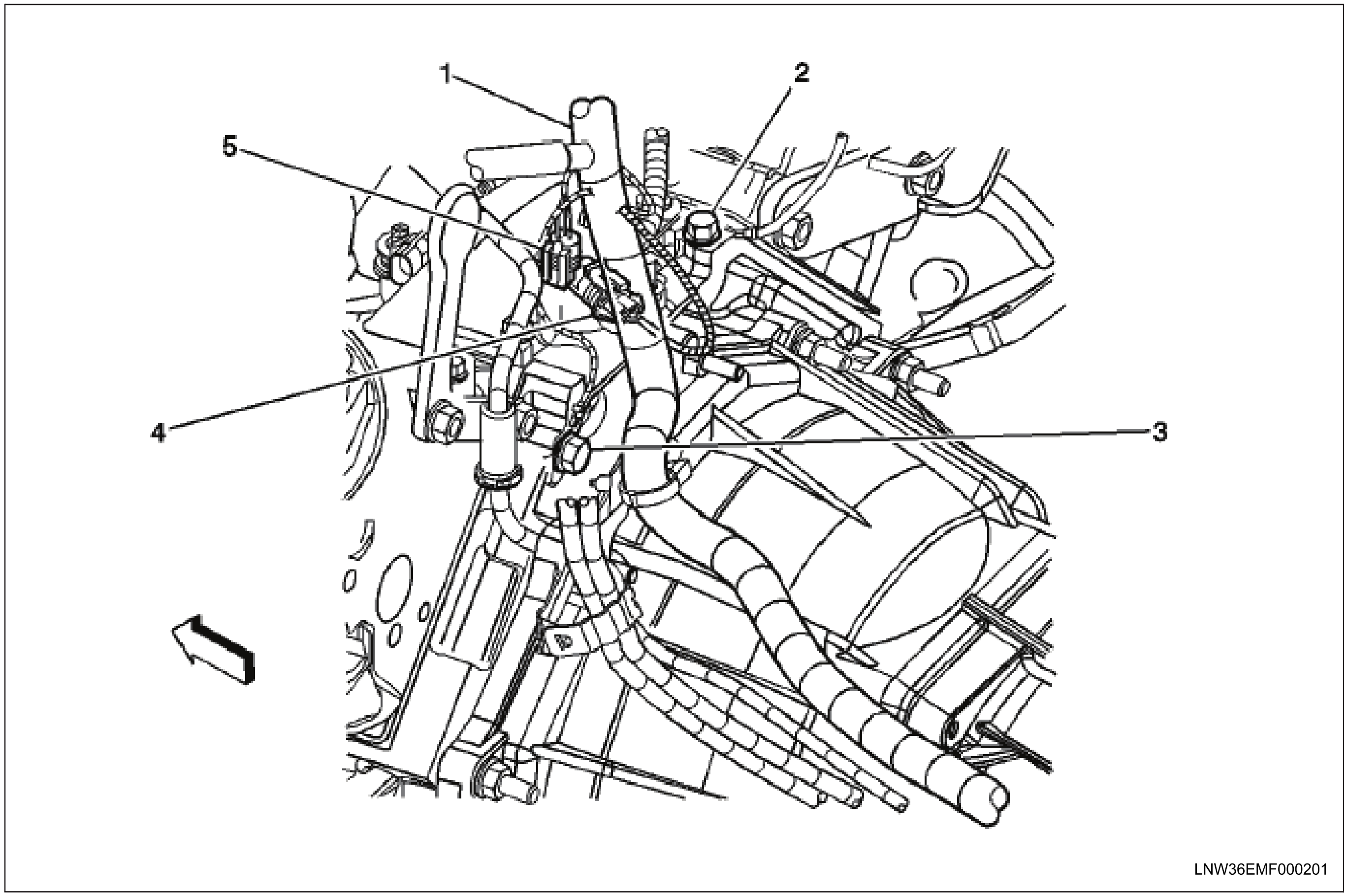
Grounding Point Location

Camshaft Position (CMP) Sensor



Legend

1. Engine Harness
2. E-39, E-129 Engine Harness Ground
3. E-38, E-106 Engine Harness Ground
4. Camshaft Position (CMP) Sensor Connector
5. Engine Oil Pressure (EOP) Sensor Connector

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Reference Table of Grounding Point

NOTICE: Abnormal phenomena of electrical components are considered resulted from defective grounding. In repair, be sure to inspect grounding points and to tighten all fastening parts surrounding the grounding points.

Connector No.	Cable harness name	Location	Main Parts (Load)
[E-55] [E-56]	Engine harness	Frame-LH (FRT)	Diagnostic connector
[E-53] [E-54]		Headlight bracket (LH)	Charge relay, Dome light switch, Meter, Starter relay, Inhibitor switch, Lighting switch, Ignition relay, Brake fluid switch, Wiper motor, Washer motor, Intermittent relay, Heater & A/C relay, Radio & clock, Cigar lighter, Fan switch, Cab interior switch, Clearance light, ID light, Illumination, Power source relay, Hazard warning switch, Turn signal light switch, Diagnostic connector, Illumination controller, Power window, Door lock, DRL, ABS indicator
[J-9]	Frame harness	Frame-RH (CTR)	Fuel gauge sensor, Fuel pump relay, ID light relay, A/C condenser fan, Speed sensor, Turn & Stop relay, Tail light relay, Rear Combination light
[J-167]	Frame harness	Frame-RH (RR)	ABS EHCU
[E-38] [E-106]	Engine harness	Engine-LH (RR)	Mass air flow sensor, Coil driver, Diagnostic connector, Powertrain control module.
[E-39] [E-129]		Engine-LH (RR)	Powertrain control module, TAC module.

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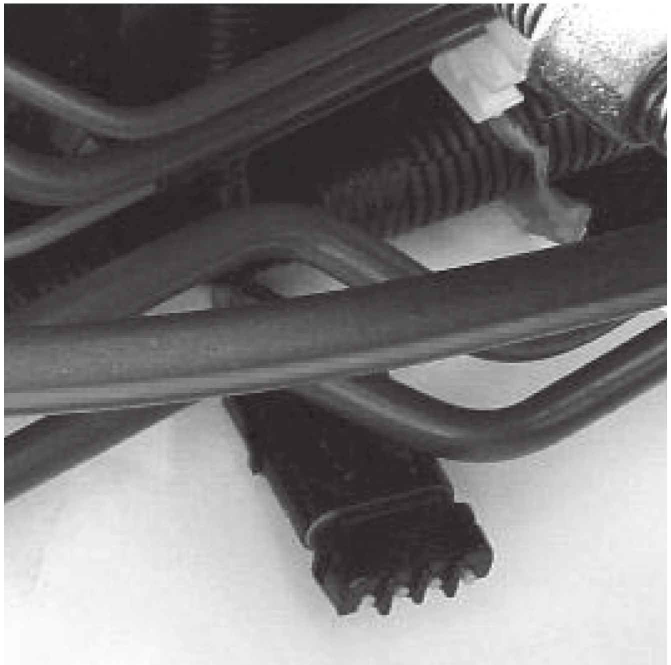
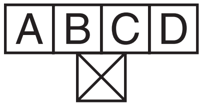
NPR/W3500 Body Room Light, I.D. and Marker Lamp, and Back-Up Lamp Connector Location

NPR/W3500 Body Connectors LH Frame



- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**
  Inside left-hand frame rail 28 to 31 inches BOC
- **Circuits:**
  Rear Dome = A
  Hot Wire = B
  Marker Lamp = C
  Ground = D



Packard Body Plug Connector Parts

	NPR/NQR
Chassis Housing ASM	1201-0974
Terminal	1208-9040
Terminal	1212-4587
Seal	1208-9679
Seal	1201-5193
Body Housing ASM	1201-5797
Housing	1201-5787
Connector Seal	1201-0492
Dummy Seal	1201-0300

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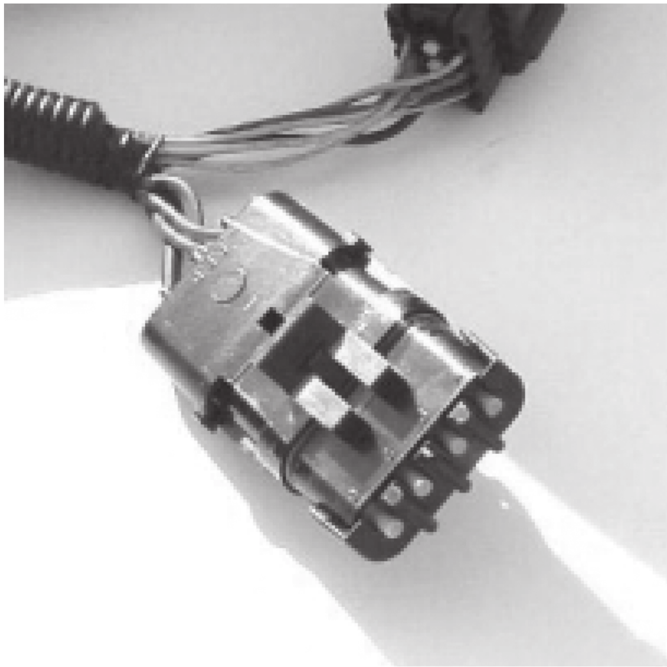
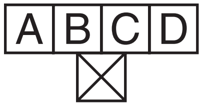
NPR/W3500 Body Room Light, I.D. and Marker Lamp, and Back-Up Lamp Connector Location (continued)

NPR/W3500 Body Connectors EOF



- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**
  Center of Crossmember
- **Circuits:**
  Rear Dome = A
  Hot Wire = B
  Marker Lamp = C
  Ground = D



Packard Body Plug Connector Parts

	NPR/NQR
Chassis Housing ASM	1201-0974
Terminal	1208-9040
Terminal	1212-4587
Seal	1208-9679
Seal	1201-5193
Body Housing ASM	1201-5797
Housing	1201-5787
Connector Seal	1201-0492
Dummy Seal	1201-0300

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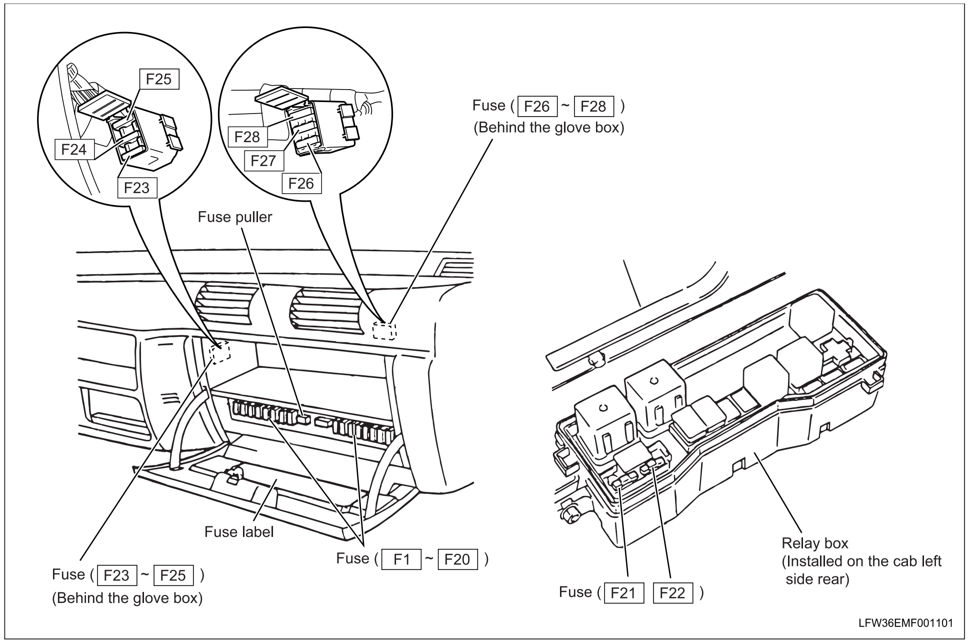
Fuse Location


F25
F24
F23
F28
F27
F26
Fuse (F26 ~ F28)
(Behind the glove box)
Fuse puller
Fuse label
Fuse (F1 ~ F20)
Fuse (F23 ~ F25)
(Behind the glove box)
Relay box
(Installed on the cab left side rear)
Fuse (F21 F22)
LFW36EMF001101

FUSE LABEL

25A ①	HEATER
10A ②	AIR CON
15A ③	PCM (IGN–1)
20A ④	ENGINE (IGN)
10A ⑤	A/T SOLENOID
10A ⑥	DOME LIGHT
10A ⑦	TAIL LIGHT
10A ⑧	STOP LIGHT
20A ⑨	HEAD LIGHT (RH)
20A ⑩	HEAD LIGHT (LH)

20A BREAKER	—

20A ⑪	WIPER, WASHER
10A ⑫	GENERATOR
10A ⑬	TURN S/LIGHT
10A ⑭	PCM (ACC)
20A ⑮	AUDIO, CIGAR LIGHTER
20A ⑯	POWER SOURCE
20A ⑰	FUEL PUMP
10A ⑱	HAZARD, HORN
15A ⑲	AUDIO
10A ⑳	STARTER

20A F-21	MARKER LIGHT
F-22	CONDENSER FAN
25A F-23	POWER WINDOW
15A F-24	DOOR LOCK
10A F-25	GAUGE, BACK
15A F-26	THROTTLE ACTUATOR CONT.
15A F-27	PCM (IGN2)

NOTICE:The fuse numbers ① ~ ⑳ indicated on the fuse labels are expressed as F-1 ~ F-20 in the circuit diagrams of this manual.

15A F-28	SPARE

LNW38AMF006501

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Fuse Box

Fuse No.	Capacity	Indication on label	Main parts (Load)
[F-1]	25A	HEATER	Blower motor, Blower resistor, Fan switch, A/C switch, A/C thermo relay, Electronic thermostat
[F-2]	10A	AIR CON	A/C switch, A/C thermo relay, Pressure switch, Magnetic clutch, Electronic thermostat, A/C enable relay
[F-3]	15A	PCM (IGN-1)	PCM, Ignition coil-LH, Inj#1, Inj#3, Inj#5, Inj#7
[F-4]	20A	ENGINE (IGN)	Automatic transmission, IAT sensor, MAP sensor, Linear EGR, CMP sensor, EVAP canister purge solenoid, Mass airflow sensor, Front O2S (LH, RH), Rear O2S (LH, RH)
[F-5]	10A	A/T SOLENOID	Automatic transmission (TCC PWM control solenoid, Shift A solenoid, Shift B solenoid)
[F-6]	10A	DOME LIGHT	Radio & clock, Dome light switch, Dome light, Door switch (LH), ID light relay, ID light, Cab interior switch, Roof marker light
[F-7]	10A	TAIL LIGHT	Tail relay, Illumination light(s), Lighting switch, Clearance light(s), Tail light(s), Illumination controller, ID light relay, License plate light
[F-8]	10A	STOP LIGHT	Stoplight switch, Flasher unit
[F-9]	20A	HEAD LIGHT (RH)	Headlight (RH), High beam indicator light, DRL
[F-10]	20A	HEAD LIGHT (LH)	Headlight (LH), Cornering light relay, Cornering light, Cornering light switch, DRL
[F-11]	20A	WIPER, WASHER	Wiper & Washer switch, Wiper motor, Washer motor, Intermittent relay
[F-12]	10A	GENERATOR	Generator, Charge relay, Heater & A/C relay
[F-13]	10A	TURN S/LIGHT	Hazard warning SW, Flasher unit
[F-14]	10A	PCM (ACC)	PCM
[F-15]	20A	AUDIO, CIGAR LIGHTER	Cigarette lighter, Radio, Power source relay
[F-16]	20A	POWER SOURCE	Power source relay, Service terminal
[F-17]	20A	FUEL PUMP	Fuel pump relay, Fuel pump, Oil pressure switch
[F-18]	10A	HAZARD, HORN	Hazard warning switch, Horn, Horn relay, Horn switch, Flasher unit
[F-19]	15A	AUDIO	Audio battery
[F-20]	10A	STARTER	Starter relay, Inhibitor switch
[F-21]	20A	MARKER LIGHT	ID light relay
[F-22]	ñ	CONDENSER FAN	Condenser fan relay
[F-23]	25A	POWER WINDOW	Power window
[F-24]	15A	DOOR LOCK	Door lock
[F-25]	10A	GAUGE, BACK	Backup light, Inhibitor Switch, Meter assembly, Cornering light relay, A/C enable relay, Ignition relay, Vacuum pump
[F-26]	15A	THROTTLE ACTUATOR CONT.	(TAC) Throttle Actuator Control
[F-27]	15A	PCM (IGN2)	Ignition coil-RH, Inj#2, Inj#4, Inj#6, Inj#8
[F-28]	15A	SPARE	SPARE

No.	Name	Capacity
(1)	MAIN	100A
(2)	KEY SW	50A
(3)	ABS	60A
(4)	RR DOME LIGHT	40A
(5)	POWER SOURCE	40A

Relay List

Connector No.	Relay name
B-9	Intermittent
B-19	Charge
B-20	Headlight
B-21	Heater & A/C
B-22	Tail
B-23	Buzzer Cancel
B-24	Horn
B-34	Power source
B-35	Cornering light
B-36	Vacuum pump
B-37	A/C thermo
B-38	Ignition
B-307	Power window
B-356	ABS indicator
J-12	Starter
J-15	A/C enable
J-16	Fuel pump
J-17	Cond fan
J-19	RR dome light
J-20	ID light

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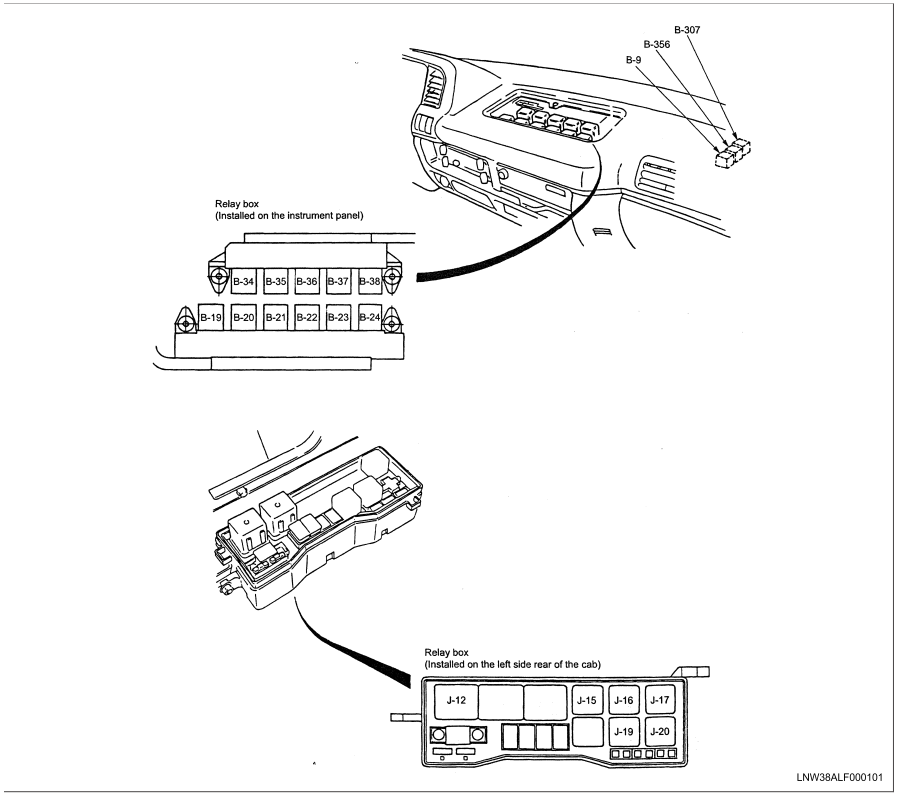
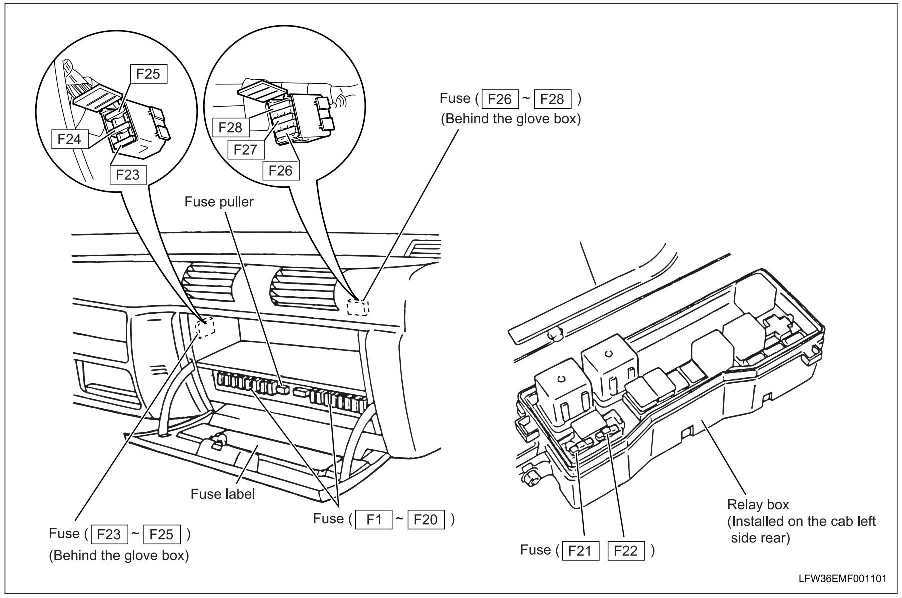
Relay Location


B-307
B-356
B-9
Relay box
(Installed on the instrument panel)
B-34
B-35
B-36
B-37
B-38
B-19
B-20
B-21
B-22
B-23
B-24
Relay box
(Installed on the left side rear of the cab)
J-12
J-15
J-16
J-17
J-19
J-20
LNW38ALF000101


F25
F24
F23
F28
F27
F26
Fuse (F26 ~ F28)
(Behind the glove box)
Fuse puller
Fuse label
Fuse (F23 ~ F25)
(Behind the glove box)
Fuse (F1 ~ F20)
Fuse (F21 F22)
Relay box
(Installed on the cab left side rear)
LFW36EMF001101

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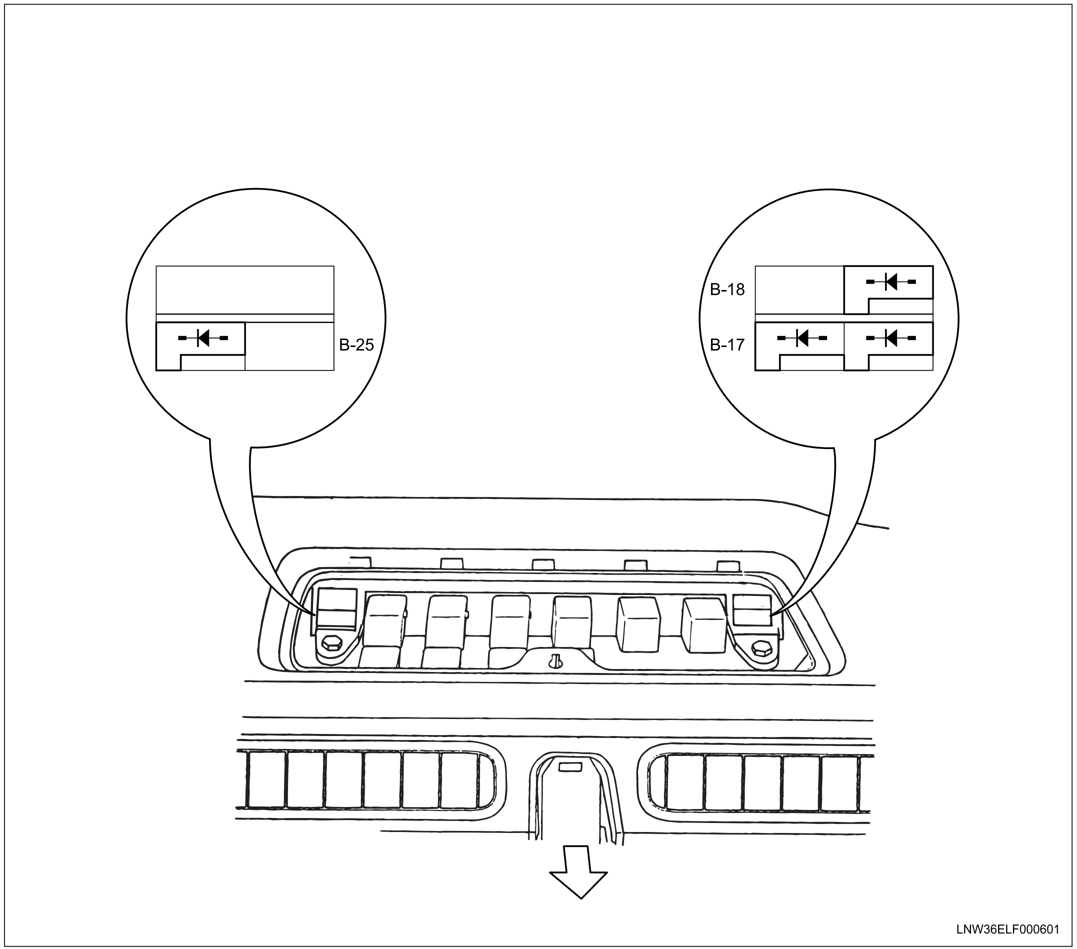
Diode Location



Connector No.	Usage
B-17	A/C
B-18	Meter (indicator)
B-25	A/C

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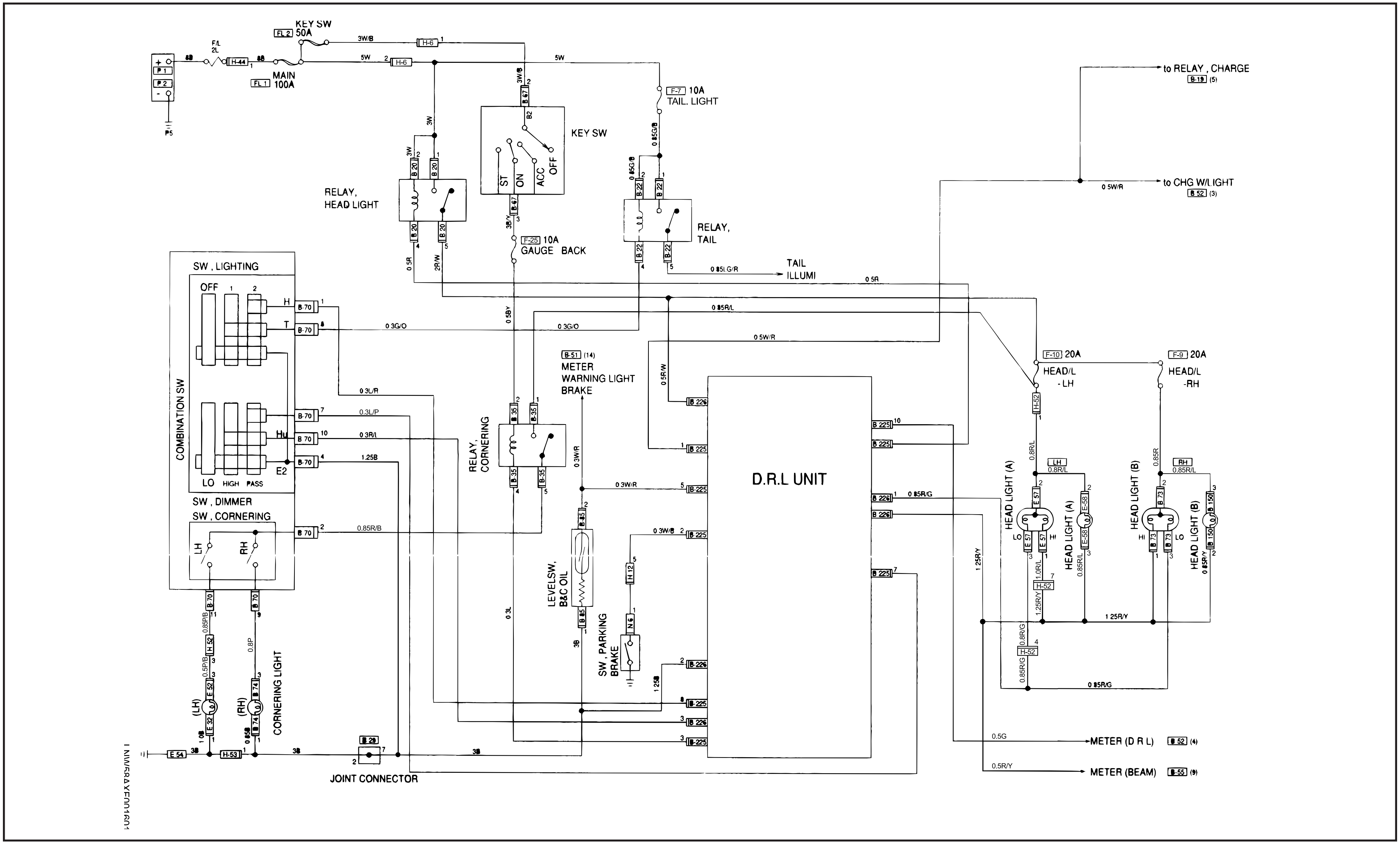
Headlights


KEY SW
FL 2 50A
FL 1 MAIN 100A
F/L 2L
H-44
H-6
3W/B
5W
P 1
P 2
P5
B 67
KEY SW
ST
ON
ACC
OFF
B2
3B/Y
F-25 10A GAUGE BACK
F-7 10A TAIL LIGHT
0.85G/B
RELAY, HEAD LIGHT
B 20
3W
0.5R
2R/W
RELAY, TAIL
B 22
0.85LG/R
TAIL ILLUMI
to RELAY, CHARGE
B-19 (5)
to CHG W/LIGHT
B 52 (3)
0.5W/R
SW, LIGHTING
OFF
1
2
H
T
Hu
E2
LO
HIGH
PASS
COMBINATION SW
SW, DIMMER
SW, CORNERING
LH
RH
B-70
0.3G/O
0.3L/R
0.3L/P
0.3R/L
1.25B
0.85R/B
0.85R/L
0.5W/R
0.5R
B-51 (14)
METER WARNING LIGHT BRAKE
RELAY, CORNERING
B 35
0.5BY
0.3W/R
0.3L
LEVELSW, B&C OIL
B 85
3B
SW, PARKING BRAKE
N 6
H 12
0.3W/B
1.25B
D.R.L UNIT
B 225
B 226
0.5R/W
0.85R/G
1.25R/Y
F-10 20A HEAD/L -LH
F-9 20A HEAD/L -RH
H-52
0.8R/L
LH 0.8R/L
RH 0.85R/L
0.85R
HEAD LIGHT (A)
HEAD LIGHT (B)
E 57
E-58
B 73
B 150
LO
HI
1.0R/L
1.25R/Y
0.8R/G
0.85R/G
0.85R/L
0.85R/Y
METER (D R L)
B 52 (4)
0.5G
METER (BEAM)
B-55 (9)
0.5R/Y
0.85P/B
0.5P/B
0.8P
E 52
E 32
B 74
(LH)
(RH)
CORNERING LIGHT
E 54
H-53
B 29
JOINT CONNECTOR
3B
1.0B
0.5B
1NMRAXF001601

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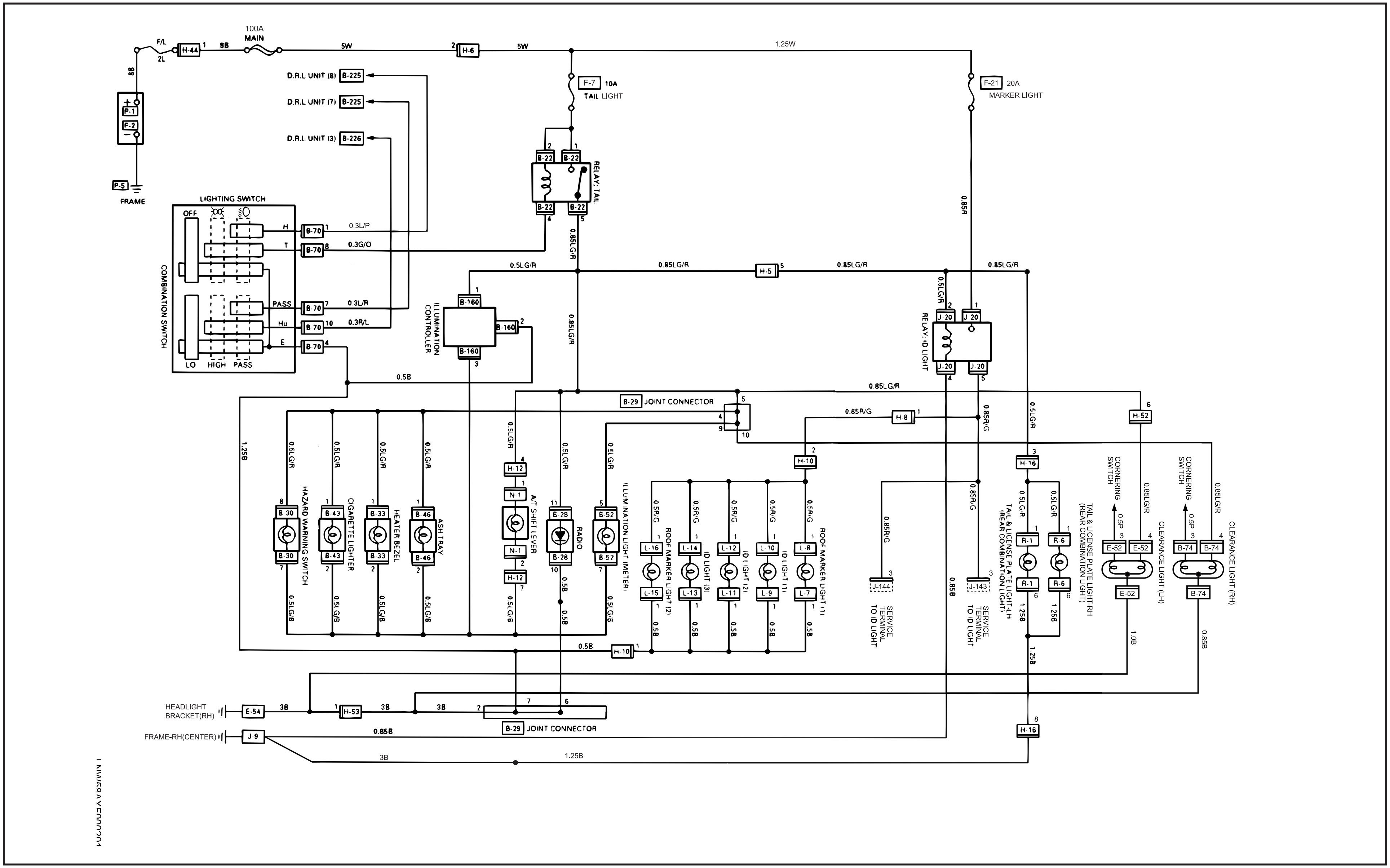
Marker Lights and Tailights


100A MAIN
F/L
2L
8B
H-44
5W
H-6
1.25W
P-1
P-2
P-5
FRAME
D.R.L UNIT (8) B-225
D.R.L UNIT (7) B-225
D.R.L UNIT (3) B-226
F-7 10A TAIL LIGHT
F-21 20A MARKER LIGHT
B-22
RELAY; TAIL
0.85LG/R
0.85R
LIGHTING SWITCH
OFF
H
T
PASS
Hu
E
LO
HIGH
PASS
COMBINATION SWITCH
B-70
0.3L/P
0.3G/O
0.3L/R
0.3R/L
0.5B
0.5LG/R
B-160
ILLUMINATION CONTROLLER
H-5
J-20
RELAY; ID LIGHT
B-29 JOINT CONNECTOR
0.85R/G
H-8
H-52
H-10
H-16
1.25B
0.5LG/R
0.5LG/B
B-30
HAZARD WARNING SWITCH
B-43
CIGARETTE LIGHTER
B-33
HEATER BEZEL
B-46
ASH TRAY
H-12
N-1
A/T SHIFT LEVER
B-28
RADIO
B-52
ILLUMINATION LIGHT (METER)
0.5R/G
L-16
L-15
ROOF MARKER LIGHT (2)
L-14
L-13
ID LIGHT (3)
L-12
L-11
ID LIGHT (2)
L-10
L-9
ID LIGHT (1)
L-8
L-7
ROOF MARKER LIGHT (1)
J-144
SERVICE TERMINAL TO ID LIGHT
J-143
SERVICE TERMINAL TO ID LIGHT
0.85B
R-1
TAIL & LICENSE PLATE LIGHT-LH (REAR COMBINATION LIGHT)
R-6
TAIL & LICENSE PLATE LIGHT-RH (REAR COMBINATION LIGHT)
CORNERING SWITCH
0.5P
E-52
CLEARANCE LIGHT (LH)
B-74
CLEARANCE LIGHT (RH)
1.0B
HEADLIGHT BRACKET(RH)
E-54
3B
H-53
FRAME-RH(CENTER)
J-9
0.85B
3B
1.25B

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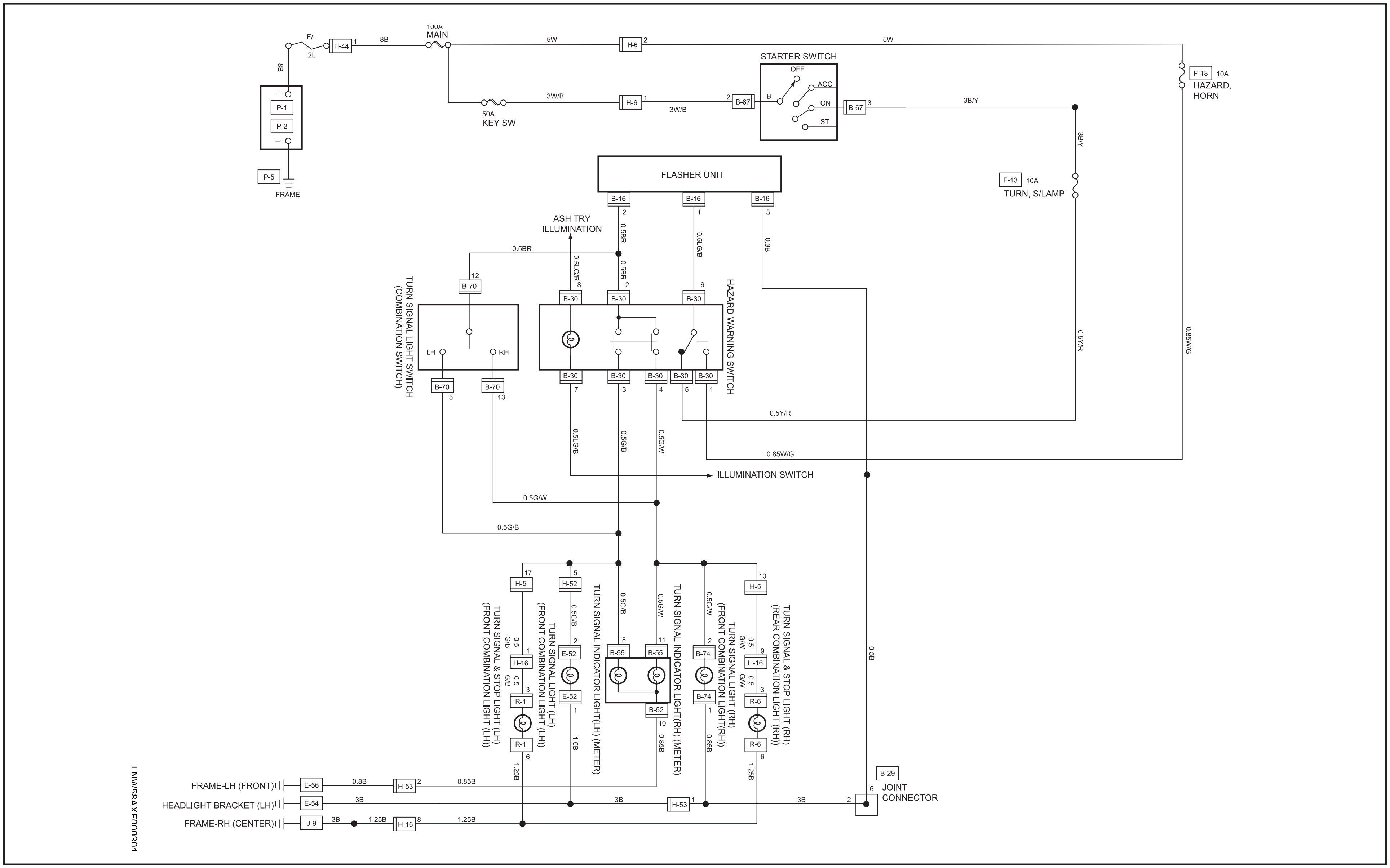
Turn Signals


F/L
2L
8B
H-44
1
8B
100A
MAIN
5W
H-6
2
5W
P-1
P-2
P-5
FRAME
50A
KEY SW
3W/B
H-6
1
3W/B
2
B-67
STARTER SWITCH
OFF
B
ACC
ON
ST
B-67
3
3B/Y
F-18
10A
HAZARD,
HORN
3B/Y
F-13
10A
TURN, S/LAMP
FLASHER UNIT
B-16
2
B-16
1
B-16
3
ASH TRY
ILLUMINATION
0.5BR
0.5BR
0.5LG/B
0.3B
0.5LG/R
8
0.5BR
2
6
12
B-70
B-30
B-30
B-30
TURN SIGNAL LIGHT SWITCH
(COMBINATION SWITCH)
LH
RH
HAZARD WARNING SWITCH
0.5Y/R
0.85W/G
B-70
5
B-70
13
B-30
7
B-30
3
B-30
4
B-30
5
B-30
1
0.5Y/R
0.5LG/B
0.5G/B
0.5G/W
0.85W/G
ILLUMINATION SWITCH
0.5G/W
0.5G/B
0.5B
17
H-5
5
H-52
10
H-5
0.5G/B
0.5G/B
0.5G/W
0.5G/W
0.5 G/B
1
H-16
0.5 G/B
3
R-1
R-1
6
1.25B
2
E-52
E-52
1
1.0B
8
B-55
11
B-55
B-52
10
0.85B
2
B-74
B-74
1
0.85B
0.5 G/W
9
H-16
0.5 G/W
3
R-6
R-6
6
1.25B
TURN SIGNAL & STOP LIGHT (LH)
(FRONT COMBINATION LIGHT (LH))
TURN SIGNAL LIGHT (LH)
(FRONT COMBINATION LIGHT (LH))
TURN SIGNAL INDICATOR LIGHT(LH) (METER)
TURN SIGNAL INDICATOR LIGHT(RH) (METER)
TURN SIGNAL LIGHT (RH)
(FRONT COMBINATION LIGHT(RH))
TURN SIGNAL & STOP LIGHT (RH)
(REAR COMBINATION LIGHT (RH))
B-29
6
JOINT
CONNECTOR
FRAME-LH (FRONT)
E-56
0.8B
H-53
2
0.85B
HEADLIGHT BRACKET (LH)
E-54
3B
3B
H-53
1
3B
2
FRAME-RH (CENTER)
J-9
3B
1.25B
H-16
8
1.25B
1NW58AXF00301

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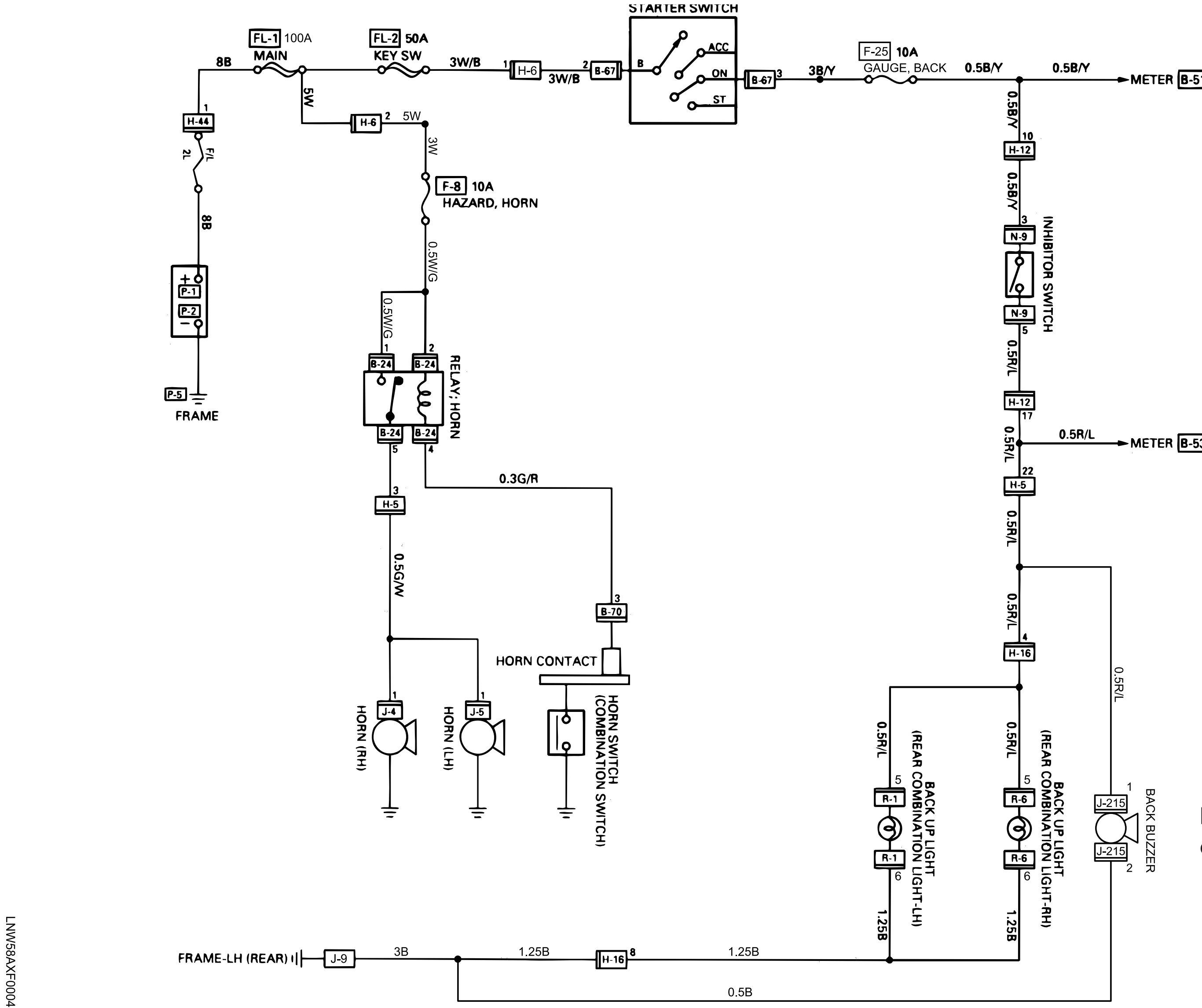
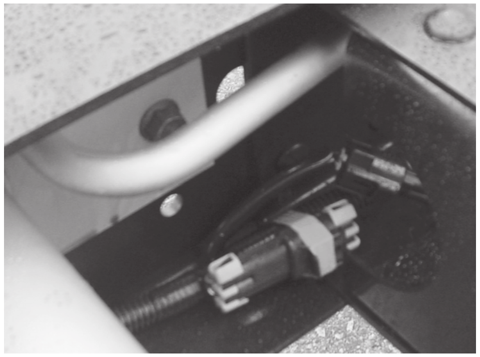
Horn, Back up Light, Back up Buzzer Circuit


STARTER SWITCH
FL-1 100A MAIN
FL-2 50A KEY SW
8B
3W/B
H-6
B-67
B
ACC
ON
ST
3W/B
3B/Y
F-25 10A GAUGE, BACK
0.5B/Y
METER B-51 (8)
5W
H-44
2L
F/L
8B
H-6 5W
3W
F-8 10A HAZARD, HORN
0.5W/G
P-1
P-2
P-5
FRAME
B-24
RELAY; HORN
H-5
0.5G/W
0.3G/R
B-70
HORN CONTACT
J-4 HORN (RH)
J-5 HORN (LH)
HORN SWITCH (COMBINATION SWITCH)
H-12
0.5B/Y
N-9
INHIBITOR SWITCH
0.5R/L
H-12
METER B-53 (4)
H-5
H-16
R-1
BACK UP LIGHT (REAR COMBINATION LIGHT-LH)
R-6
BACK UP LIGHT (REAR COMBINATION LIGHT-RH)
J-215
BACK BUZZER
1.25B
FRAME-LH (REAR)
J-9
3B
H-16
0.5B
LNW58AXF00040



Back Buzzer circuit connector located on LH rail aft of last cross member

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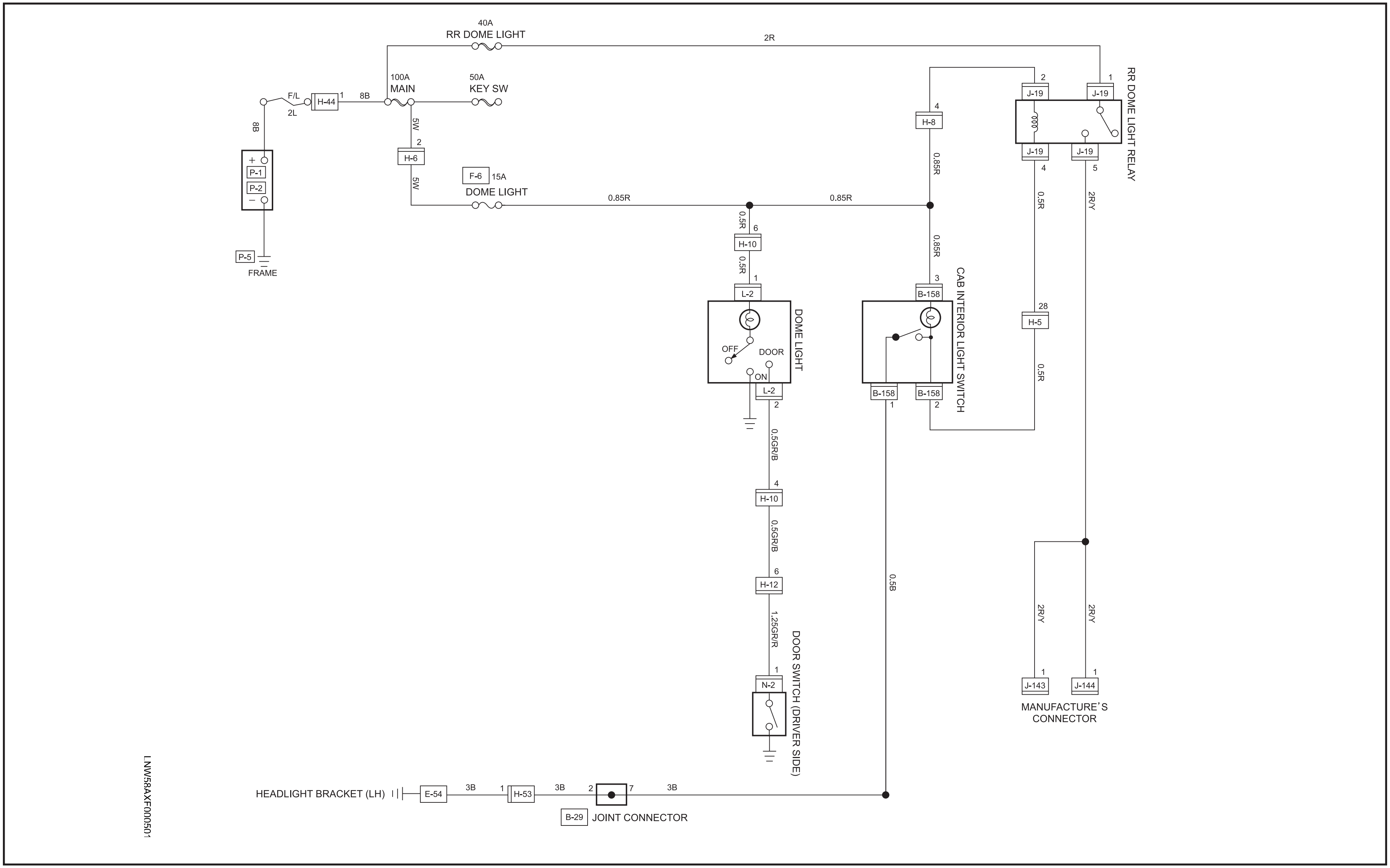
Cab Interior Lights, Rear Body Interior Light Circuit


40A
RR DOME LIGHT
2R
100A
MAIN
50A
KEY SW
F/L
2L
H-44
1
8B
8B
5W
2
H-6
5W
P-1
P-2
+
−
P-5
FRAME
F-6
15A
DOME LIGHT
0.85R
0.85R
4
H-8
0.85R
0.85R
2
1
J-19
J-19
J-19
J-19
4
5
RR DOME LIGHT RELAY
0.5R
2R/Y
0.5R
6
H-10
0.5R
1
L-2
DOME LIGHT
OFF
DOOR
ON
L-2
2
0.5GR/B
4
H-10
0.5GR/B
6
H-12
1.25GR/R
1
N-2
DOOR SWITCH (DRIVER SIDE)
3
B-158
CAB INTERIOR LIGHT SWITCH
B-158
1
B-158
2
28
H-5
0.5R
0.5B
2R/Y
2R/Y
1
J-143
1
J-144
MANUFACTURE'S CONNECTOR
HEADLIGHT BRACKET (LH)
E-54
3B
1
H-53
3B
2
7
3B
B-29
JOINT CONNECTOR
LNW58AXF000501

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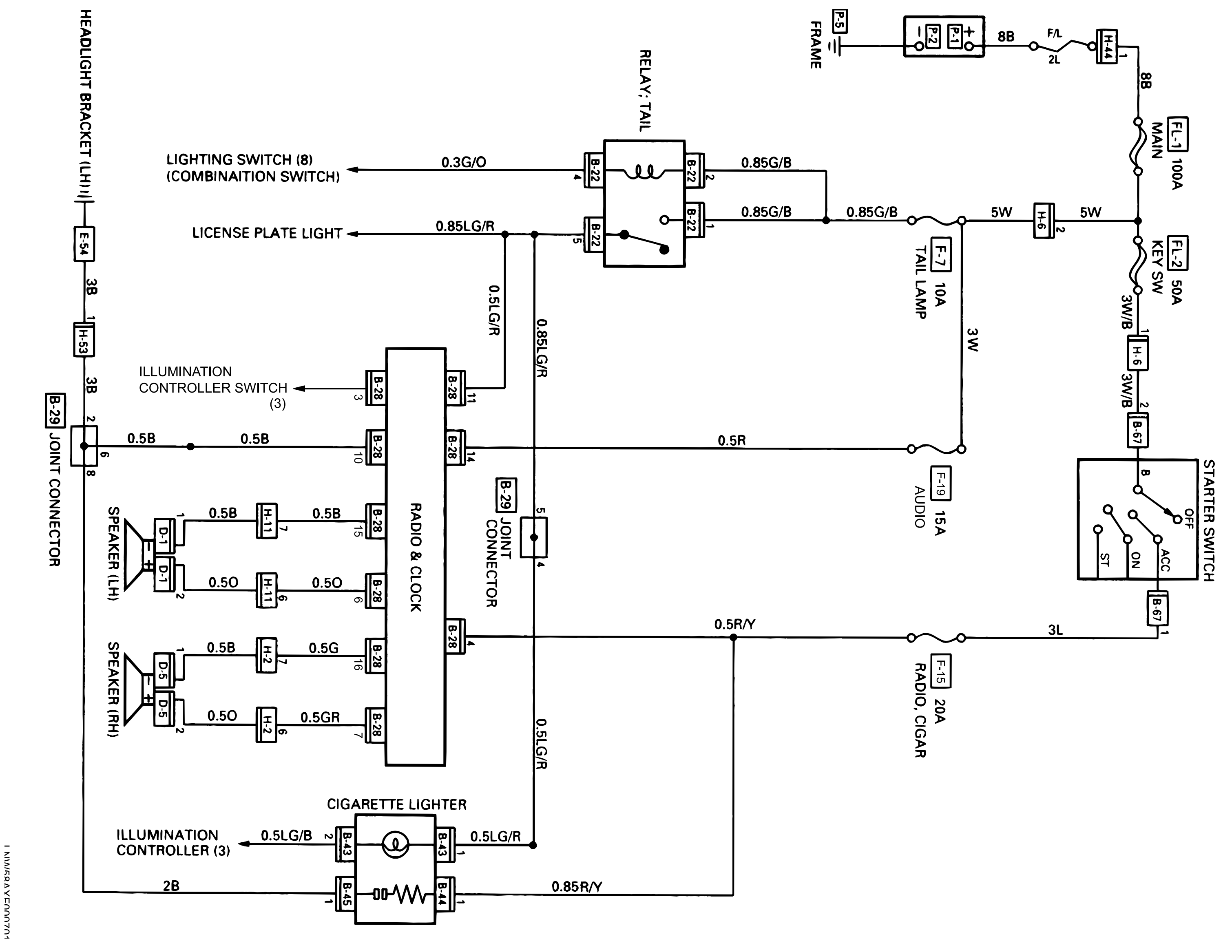
Radio and Cigar Lighter Circuits


HEADLIGHT BRACKET (LH)
E-54
3B
H-53
B-29 JOINT CONNECTOR
0.5B
2B
LIGHTING SWITCH (8) (COMBINAITION SWITCH)
0.3G/O
LICENSE PLATE LIGHT
0.85LG/R
0.5LG/R
ILLUMINATION CONTROLLER SWITCH (3)
RELAY; TAIL
B-22
0.85G/B
RADIO & CLOCK
B-28
0.5R
0.5R/Y
SPEAKER (LH)
SPEAKER (RH)
D-1
D-5
H-11
H-2
0.5O
0.5G
0.5GR
B-29 JOINT CONNECTOR
CIGARETTE LIGHTER
ILLUMINATION CONTROLLER (3)
0.5LG/B
B-43
B-44
B-45
0.85R/Y
P-5 FRAME
P-2
P-1
8B
F/L
2L
H-44
FL-1 MAIN 100A
FL-2 KEY SW 50A
5W
H-6
F-7 TAIL LAMP 10A
3W
3W/B
B-67
F-19 AUDIO 15A
STARTER SWITCH
OFF
ACC
ON
ST
3L
F-15 RADIO, CIGAR 20A
1NMSBAYE00070

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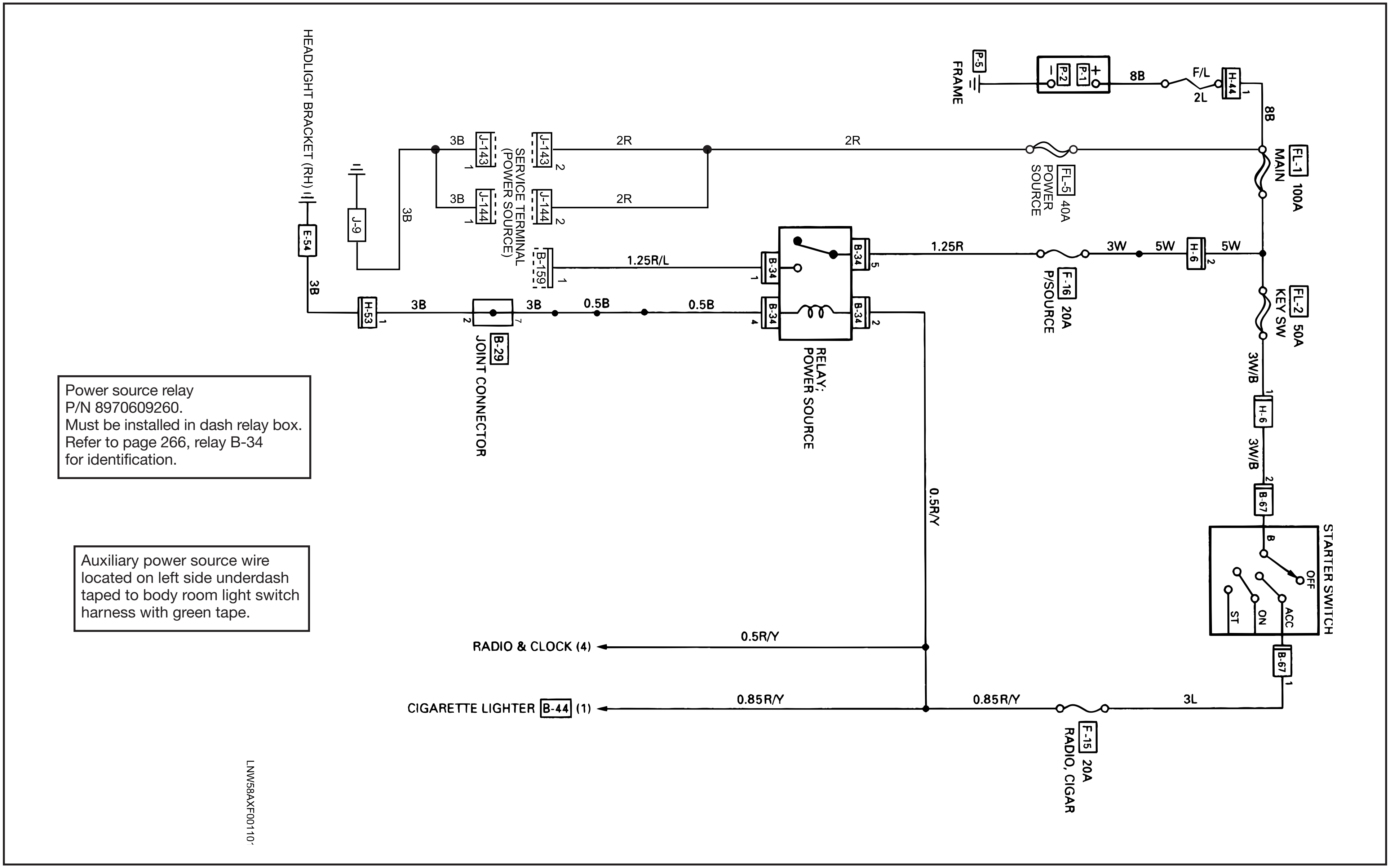
Auxiliary Power Source Circuit Diagram


HEADLIGHT BRACKET (RH)
E-54
3B
J-9
3B
J-143
1
3B
J-144
1
J-143
2
J-144
2
SERVICE TERMINAL (POWER SOURCE)
2R
2R
2R
B-159
1
1.25R/L
H-53
1
3B
2
B-29
7
JOINT CONNECTOR
3B
0.5B
0.5B
B-34
1
B-34
4
B-34
5
B-34
2
RELAY; POWER SOURCE
1.25R
F-16
20A
P/SOURCE
3W
5W
H-6
2
5W
P-5
FRAME
P-2
P-1
8B
F/L
2L
H-44
1
8B
FL-5
40A
POWER SOURCE
FL-1
MAIN
100A
FL-2
KEY SW
50A
3W/B
1
H-6
3W/B
2
B-67
STARTER SWITCH
B
OFF
ACC
ON
ST
B-67
1
0.5R/Y
0.5R/Y
RADIO & CLOCK (4)
0.85R/Y
CIGARETTE LIGHTER
B-44
(1)
0.85R/Y
F-15
20A
RADIO, CIGAR
3L
LNW58AXF00110

Power source relay
P/N 8970609260.
Must be installed in dash relay box.
Refer to page 266, relay B-34
for identification.

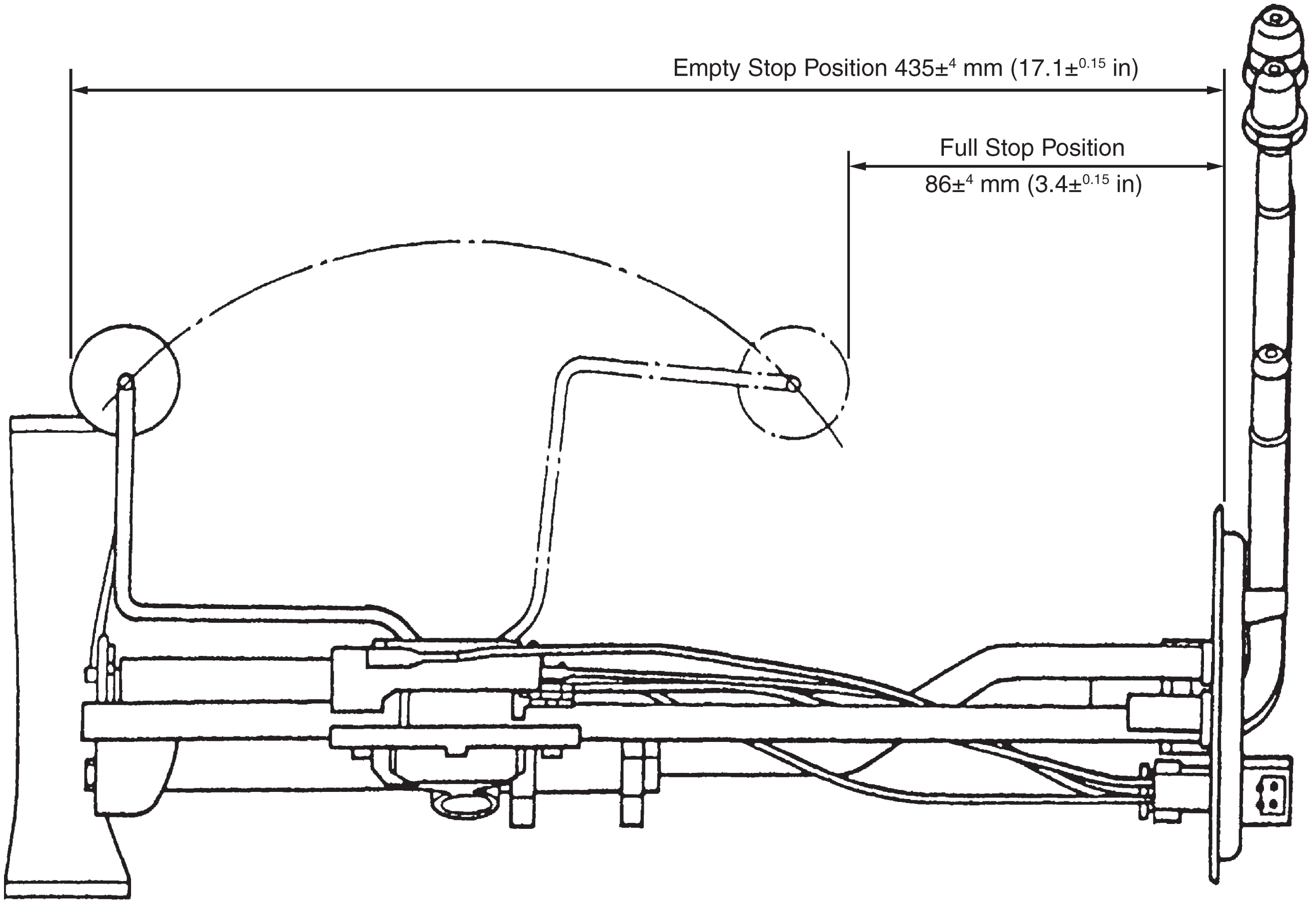
Auxiliary power source wire located on left side underdash taped to body room light switch harness with green tape.

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40

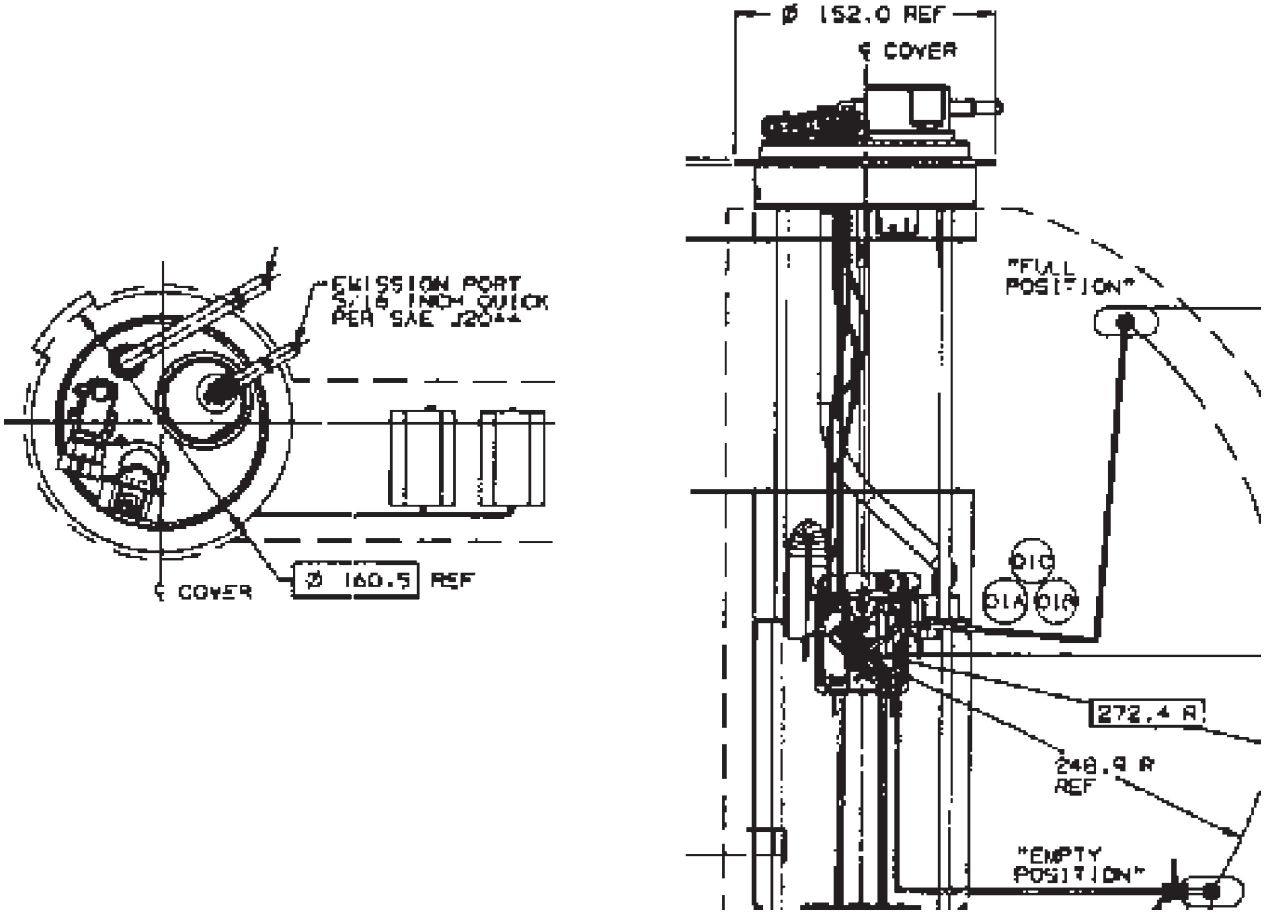

Empty Stop Position 435±^{4} mm (17.1±$^{0.15}$ in)
Full Stop Position
86±^{4} mm (3.4±$^{0.15}$ in)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500 Gas Electrical – continued from previous page)

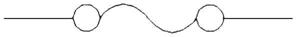
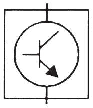
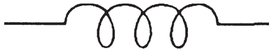
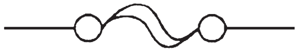
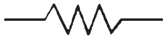
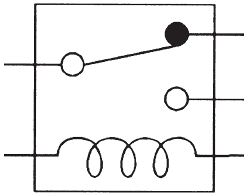
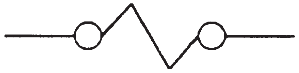
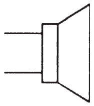
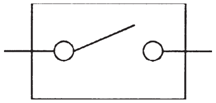
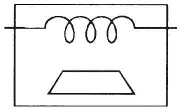
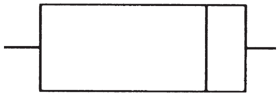
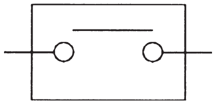
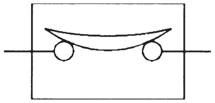
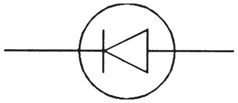
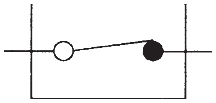
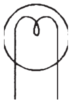
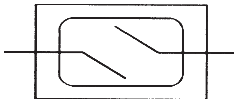
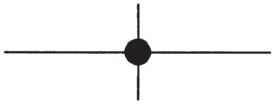
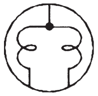
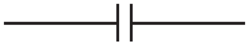
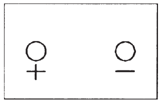
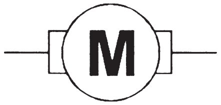
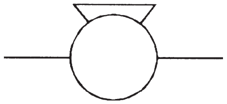
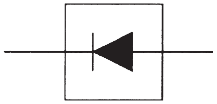
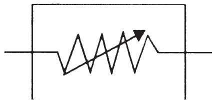
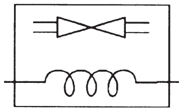
Model Year Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40


Ø 152.0 REF
℄ COVER
"FULL POSITION"
EMISSION PORT 5/16 INCH QUICK PER SAE J2044
℄ COVER
Ø 160.5 REF
D1C
D1A
D1B
272.4 R
248.9 R REF
"EMPTY POSITION"

NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical

Symbols

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Fuse		Electronic Parts		Coil (Inductor), Solenoid Magnetic Valve
	Fusible Link		Resistor		Relay
	Fusible Link Wire		Speaker		
	Switch		Buzzer		Connector
	Switch		Circuit Breaker		Light-Emitting Diode
	Switch (Normal Close Type)		Bulb		Reed Switch
	Contact Wiring		Double-Filament Bulb		Condenser
	Battery		Motor		Horn
	Diode		Variable Resistor Rheostat		Vacuum Switching Valve

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Abbreviations

Abbreviation	Definition	Abbreviation	Definition
6A/T	6-speed automatic transmission	IG	Ignition
4A/T	4-speed automatic transmission	kW	Kilowatt
A/T	Automatic transmission	LH	Left Hand
ABS	Anti-lock brake system	LWB	Long Wheelbase
APP	Accelerator pedal position	M/T	Manual Transmission
ATF	Automatic transmission fluid	M/V	Magnetic valve
AUTO	Automatic	MAF	Mass air flow
BRKT	Bracket	MIL	Check engine light
C/B	Circuit breaker	OD	Overdrive
CKP	Crankshaft position	OPT	Option
CMP	Camshaft position	RWAL	Rear Wheel Anti-lock Brake System
COMB	Combination	PTO	Power Take Off
CONT	Control	RH	Right Hand
D.R.L.	Day time running light	RR	Rear
DC	Direct Current	SCV	Suction control valve
ECM	Electronic control module	ST	Start
ECT	Engine coolant temperature	STD	Standard
ECU	Electronic control unit	SW	Switch
EGR	Exhaust gas reticulation	SWB	Short Wheelbase
EHCU	Electronic and hydraulic control unit	TCM	Transmission Control Module
FL	Fusible link	V	Volt
FRT	Front	VSV	Vacuum Switching Valve
FT	Fuel temperature	W	Watt (S)
H/L	Headlight	W/	With
HI	High	W/O	Without
IAT	Intake air temperature	W/S	Weld splice
IC	Integrated circuit	WOT	Wide-open Throttle
LO	Low		

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Wiring

Wire Color

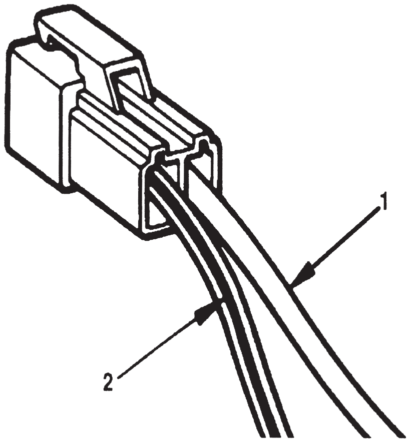
All wires have color-coded insulation. Wires belonging to a system's main harness will have a single color. Wires belonging to a system's sub-circuits will have a colored stripe. Striped wires use the following code to show wire size and colors.

Example: 0.5 G / R

R — Red (Stripe Color)

G — Green (Base Color)

0.5 — Wire Size (0.5 mm^2)



1. Single Color Wire
2. Colored Stripe Wire

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

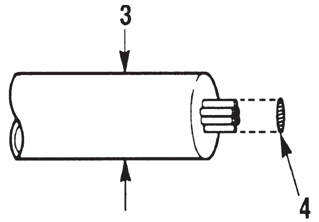
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Abbreviations are used to indicate wire color within a circuit diagram. Refer to the following table.

Color-Coding	Meaning	Color-Coding	Meaning
B	Black	BR	Brown
W	White	LG	Light Green
R	Red	GR	Grey
G	Green	P	Pink
Y	Yellow	LB	Light Blue
L	Blue	V	Violet
O	Orange		

Wire Size

The size of wire used in a circuit is determined by the amount of current (amperage), the length of the circuit, and the voltage drop allowed. The following wire size and load capacity are specified by AWG (American Wire Gauge). (Nominal size means approximate cross sectional area.)



3. Outside Diameter
4. Cross Sectional Area

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

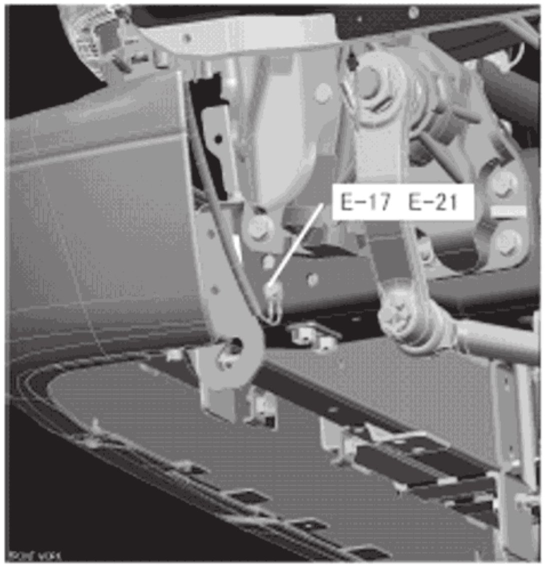
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

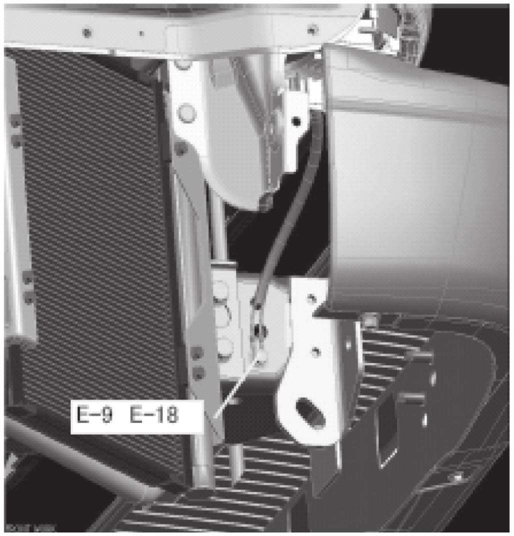
Nominal Size	Cross Sectional Area (mm^2)	Outside Diameter (mm)	Allowable Current (A)	AWG Size (Cross reference)
0.3	0.372	1.8	9	22
0.5	0.563	2.0	12	20
0.85	0.885	2.2	16	18
1.25	1.287	2.5	21	16
2	2.091	2.9	28	14
3	3.296	3.6	37.5	12
5	5.227	4.4	53	10
8	7.952	5.5	67	8
15	13.36	7.0	75	6
20	20.61	8.2	97	4

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Grounding Point Location



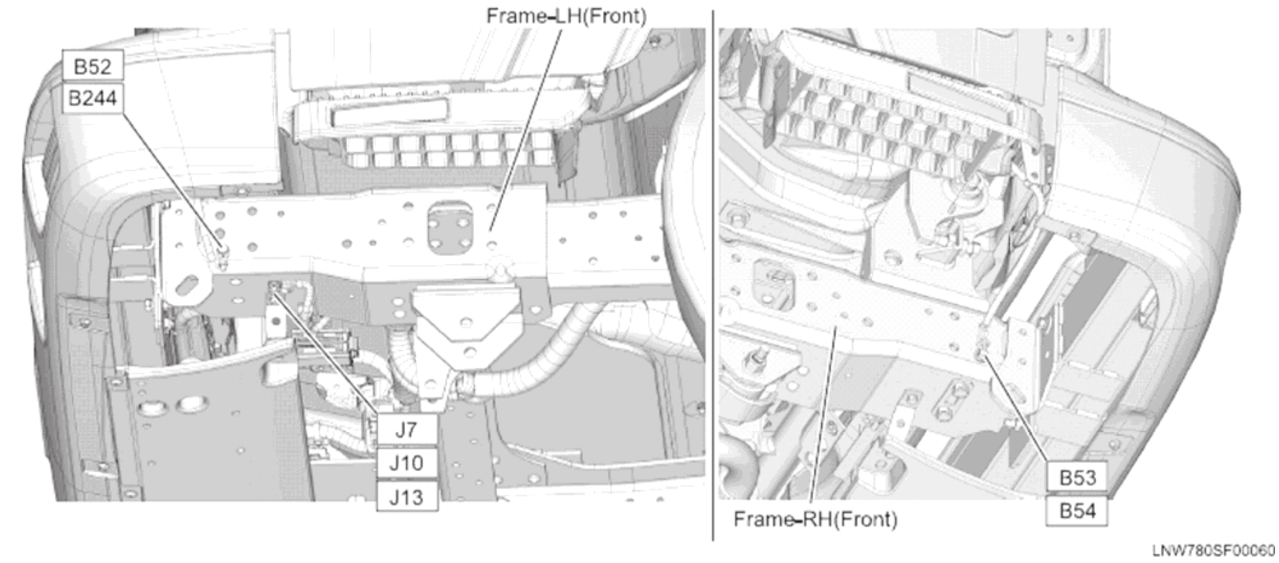


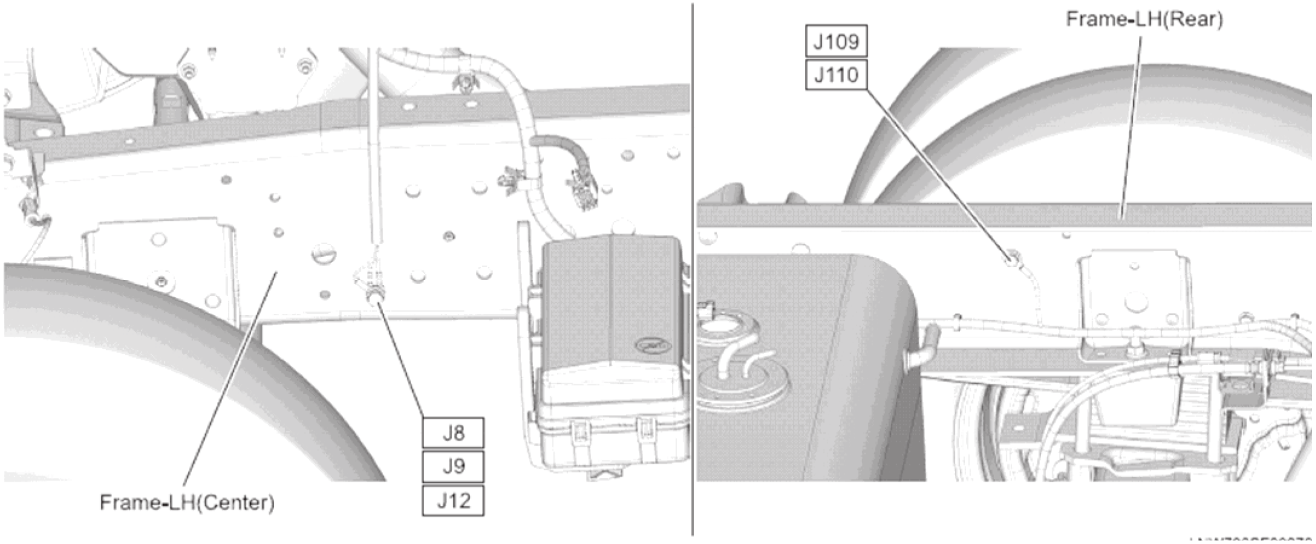
Connector No.	Location	Main Parts (Load)
E-21	LH	Cigar lighter, Accessory socket, Key on relay, Power ACC relay, Headlamp relay, Rear dome lamp relay, Radio, Meter, Blower resistor, Flasher unit, Intermittent relay, Side turn lamp, Roof marker lamp,
E-9	RH	Blower, Wiper motor
E-17	LH	Illumination control switch, Power window, Headlamp, Vacuum pump, Mirror heater, Door lack, Front turn lamp, Front position lamp, TCM relay, Power window relay, Over drive off switch, Meter, Diagnostic connector
E-18	RH	TCM, Headlamp, Daytime running lamp CU, Mirror heater, Diagnostic connector, Front position lamp, DMU, Termo switch, A/C switch, Side marker lamp, Front turn lamp

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Grounding Point Location


Frame-LH(Front)
B52
B244
J7
J10
J13
Frame-RH(Front)
B53
B54
LNW780SF00060


J109
J110
Frame-LH(Rear)
J8
J9
J12
Frame-LH(Center)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

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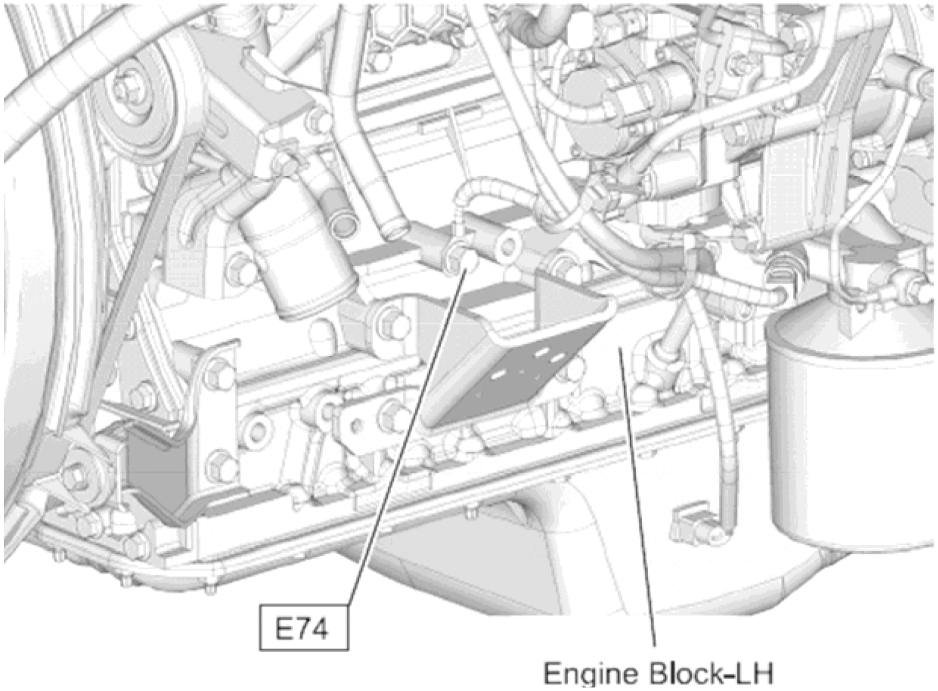
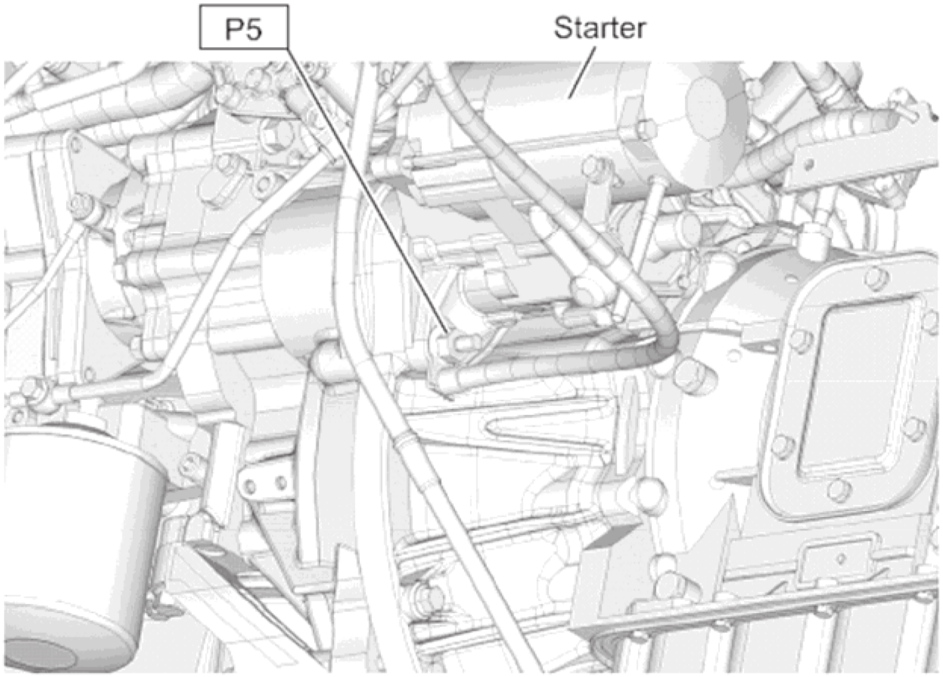
Grounding Point Location





(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

((Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Reference Table of Grounding Point

NOTICE: Abnormal phenomena of electrical components are considered resulted from defective grounding. In repair, be sure to inspect grounding points and to tighten all fastening parts surrounding the grounding points.

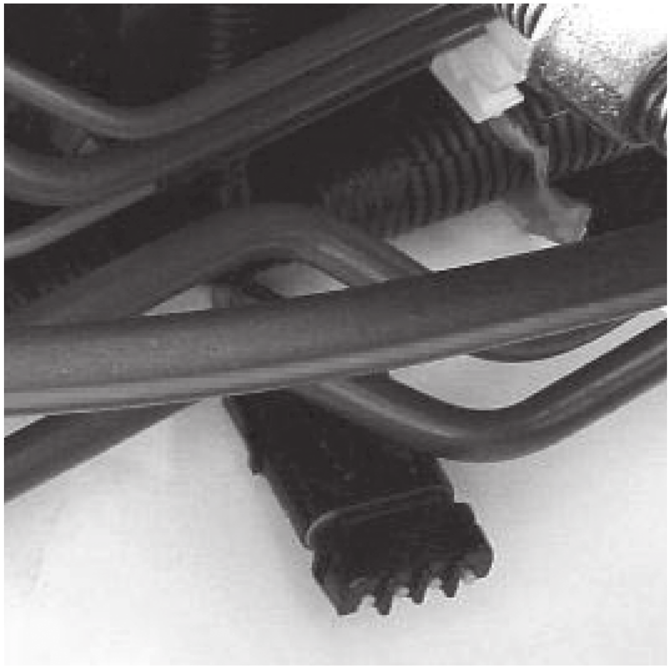
Connector No.	Cable Harness Name	Location	Main Parts (Load)
B-52, B-244	Cab Harness	Frame LH Front	Power Window Switch, Illumination Control Switch, Head Light LH, Vacuum Pump, Mirror Heater LH
B-53, B-54	Cab Harness	Frame RH Front	DRL Control Unit, Mirror Heater RH, Power Window Switch, Transmission Control Module (TCM), Head Light RH
J-7, J-10, J-13	Front Frame Harness	Frame LH Front	Fuel Tank Unit (Side), Electronic Hydraulic Control Unit (EHCU), Select Position Switch, Condenser Fan Motor, Triple Pressure Switch, Hydraulic Booster Brake (HBB) Oil Level, Marker Light Relay
J-8, J-9, J-12	Front Frame Harness	Frame LH Center	Front Manufacturer Connector, Engine Control Module (ECM)
J-109, J-110	Rear Frame Harness	Frame LH Rear	Rear Manufacturer Connector, Fuel Tank Unit (In-Frame), Rear Combination Lamp, Back Buzzer DOP, PTO Speed Control Switch (Upfitter Install)
E-74	Engine Harness	Engine Block LH	Engine Oil Level Switch
P-5	Starter Earth Cable	Starter	Starter

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

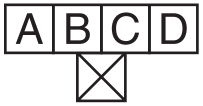
((Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Body Room Light, I.D. and Marker Lamp, and Hot Wire and Ground Connector Location

NPR/W3500, NPR HD/W4500 NQR/W5500, NRR/W5500 HD Body Connectors LH Frame



- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**
  Inside left-hand frame rail 28 to 31 inches BOC
- **Circuits:**
  Marker Lamp = A
  Hot Wire = B
  Rear Dome = C
  Ground = D



Packard Body Plug Connector Parts

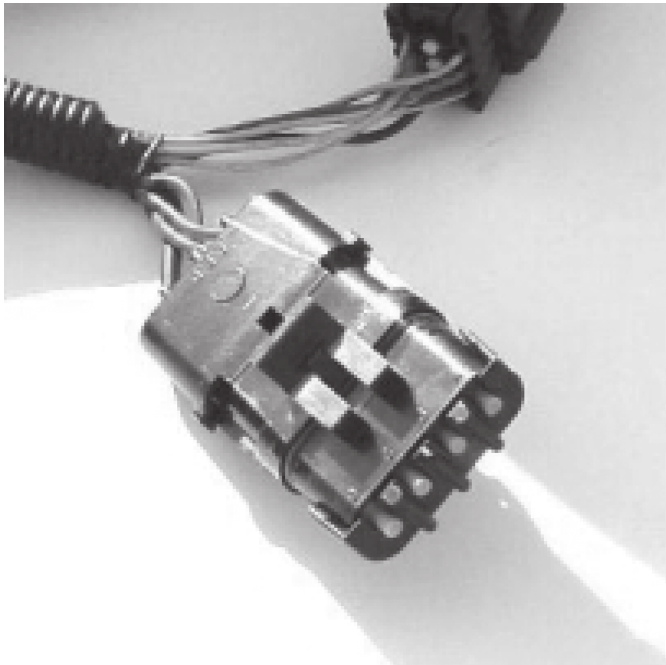
	NPR/NQR/NRR
Chassis Housing ASM	1201-0974
Terminal	1208-9040
Terminal	1212-4587
Seal	1208-9679
Seal	1201-5193
Body Housing ASM	1201-5797
Housing	1201-5787
Connector Seal	1201-0492
Dummy Seal	1201-0300

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

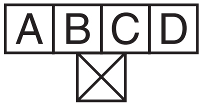
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Body Room Light, I.D. and Marker Lamp, Hot Wire and Ground Connector Location (continued)

NPR/W3500, NPR HD/W4500 NQR/W5500, NRR/W5500 HD Body Connectors LH Frame



- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**
  Center of Crossmember
- **Circuits:**
  Marker Lamp = A
  Hot Wire = B
  Rear Dome = C
  Ground = D



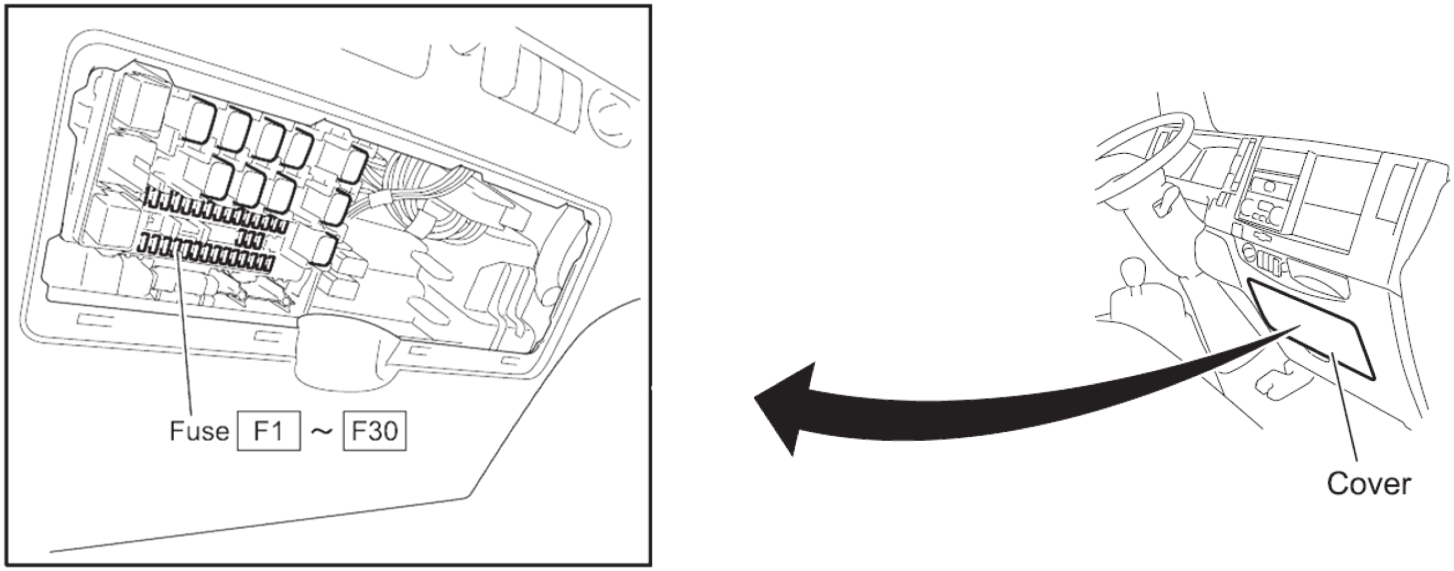
Packard Body Plug Connector Parts

	NPR/NQR/NRR
Chassis Housing ASM	1201-0974
Terminal	1208-9040
Terminal	1212-4587
Seal	1208-9679
Seal	1201-5193
Body Housing ASM	1201-5797
Housing	1201-5787
Connector Seal	1201-0492
Dummy Seal	1201-0300

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Fuse Location



FUSE LABEL

RR P/WINDOW	—	ROOM LAMP	DOOR LOCK	—	P/WINDOW	BACK UP LAMP	WIPER	H/LAMP LO (LH)	LAMPS (BATT)	H/LAMP LO (RH)	BRAKE LAMPS	STARTER	H/LAMP HI (LH)	H/LAMP HI (RH)
25A		10A	15A		25A	10A	25A	10A	10A	10A	10A	10A	10A	10A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

P. NO. 898054 3190

SPARE SPARE SPARE

MIRROR HEATER	IGNITION2	IGNITION1	—	ECM	METER	ECM (BATT)	MIRROR	ACCESSORIES	HORN	TURN, HAZARD	TAIL LAMPS	ILLUMINATIONS	CORNERING LAMPS	AIR CONDITIONER
15A	10A	10A		10A	10A	10A	10A	15A	15A	15A	10A	10A	10A	10A
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

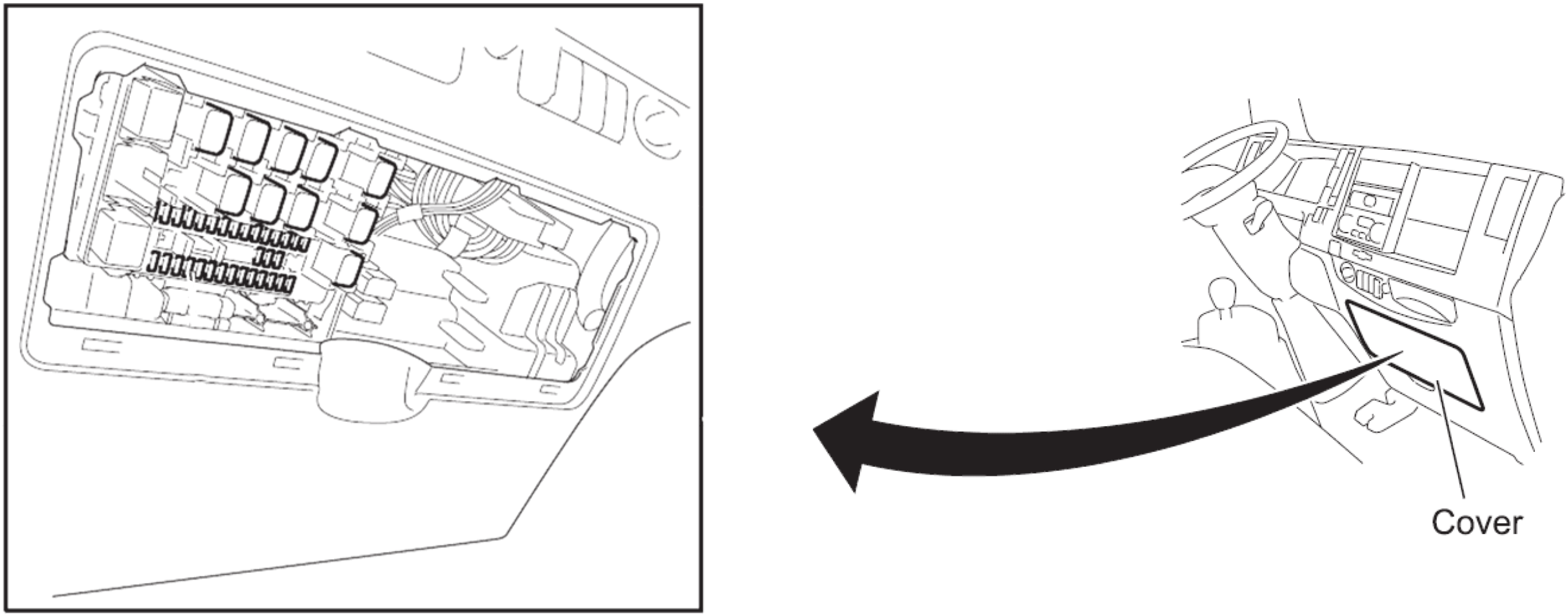
Fuse Box

Fuse No	Capacity	Indication on Label	Main Parts(Load)
F-1	25A	RR P/WINDOW	Rear Power Window Relay, Rear Power Window SwitchR/ LH, Rear Power Window MotorR/LH
F-2	-	-	-
F-3	10A	ROOM LIGHT	Charge Relay, Flasher Unit, Combination Switch, Front Cornering Light R/LH, Hazard Switch, Data Link Connector
F-4	15A	DOOR LOCK	Power Window Relay, Front Power Window SwitchR/LH, Front Power Window MotorR/LH, Door Lock Relay, Door Lock Switch
F-5	-	-	-
F-6	25A	P/WINDOW	Front Power Window Switch R/LH
F-7	10A	BACK UP LIGHT	Back Up MT Switch, Rear Combination Light R/LH, Back Buzzer Dop, Back Up Switch, Automatic Transmission
F-8	25A	WIPER	Wiper Main Relay, Wiper Hi Relay, Front Wiper Motor
F-9	10A	H/LIGHT LO(LH)	Rear Dome Light Relay
F-10	10A	LIGHT (BATT)	Headlight Lo Relay, Headlight RH, DRL Relay
F-11	10A	H/LIGHT LO(RH)	Headlight Lo Relay, Headlight LH
F-12	10A	BRAKE LIGHT	
F-13	10A	STARTER	Headlight Lo Relay, Stoplight Relay, Stoplight Switch, Side Marker RH/LH
F-14	10A	H/LIGHT HI(LH)	Headlight Hi Relay, Headlight LH, Instrument Panel Cluster(IPC)
F-15	10A	H/LIGHT HI(RH)	Headlight Hi Relay, Headlight RH
F-16	15A	MIRROR HEATER	Rear Window Lock Switch, Rear Power Windor, Mirror Heater Switch, Mirror HeaterR/LH
F-17	10A	IGNITION2	Blow Relay, Fan Control Switch
F-18	10A	IGNITION1	PTO Enable Relay, Load Engaged Switch, Engine Control Module(ECM), Vacuum Pump Relay, Vacuum Pump Motor
F-19	-	-	-
F-20	10A	ECM	Engine Control Module(ECM), Combination Switch
F-21	10A	METER	Instrument Panel Cluster(IPC), Fuel Tank Unit, DMU, PTO Switch, Electronic Hydraulic Control Unit(EHCU)
F-22	10A	ECM(BATT)	Flasher Unit, Combination Switch, Hazard Switch, Check Miles & Check Oil Level, TCM Relay, Transmission Control Module(TCM)
F-23	10A	MIRROR	Wiper Main Relay, Wiper Hi Relay, Front Wiper Motor, Wiper & Exhaust Brake Switch, Intermittent Relay
F-24	15A	ACCESSORIES	Transmission Control Module(TCM), VGS Control Unit, Glow Controller, Engine Control Module(ECM), Radio, Speaker R/LH, Cigarlighter Relay
F-25	15A	HORN	Horn Relay , Horn R/LH, Horn Switch
F-26	15A	TURN, HAZARD	DRL Relay, Headlight Hi Relay, DRL Control Relay, Tail Relay, Flasher Unit
F-27	10A	TAIL LIGHT	Front Position Light RH, Front Position Light LH, Identification Light 1/2/3, Roof Marker Light1/2
F-28	10A	ILLUMINATIONS	Pressure Switch, B-Coil Level Switch, Check Miles & Check Oil Level
F-29	10A	CORNERING LIGHT	Front Cornering LightR/LH, Cornering Switch
F-30	10A	AIR CONDITIONER	Magnetic Clutch Relay
F-31	20A	MARKER LAMP	Blower Motor, Marker Light Relay
F-32	20A	TAIL MAIN	Tail Relay
F-33	10A	ECM	Engine Control Module(ECM), VGS Control Unit
F-34	-	-	-
F-35	-	-	-
F-36	15A	RR DOME LIGHT	Rear Dome Light Relay , Front Manufucture Connector, Rear Manufucture Connector
F-37	10A	CONDENSER FAN	Condenser Fan Relay, Condenser Fan, Triple Presure Switch
F-38	10A	A/C	Magnetic Clutch Relay, A/C Compressor, Condenser Fan Relay
F-39	20A	CIGAR	Cigarlighter
F-40	10A	ACCESSORIES SOCKET	Accessories Socket
F-41	20A	POWER SOURCE	Front Manufacture Connector, Rear Manufacture Connector

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

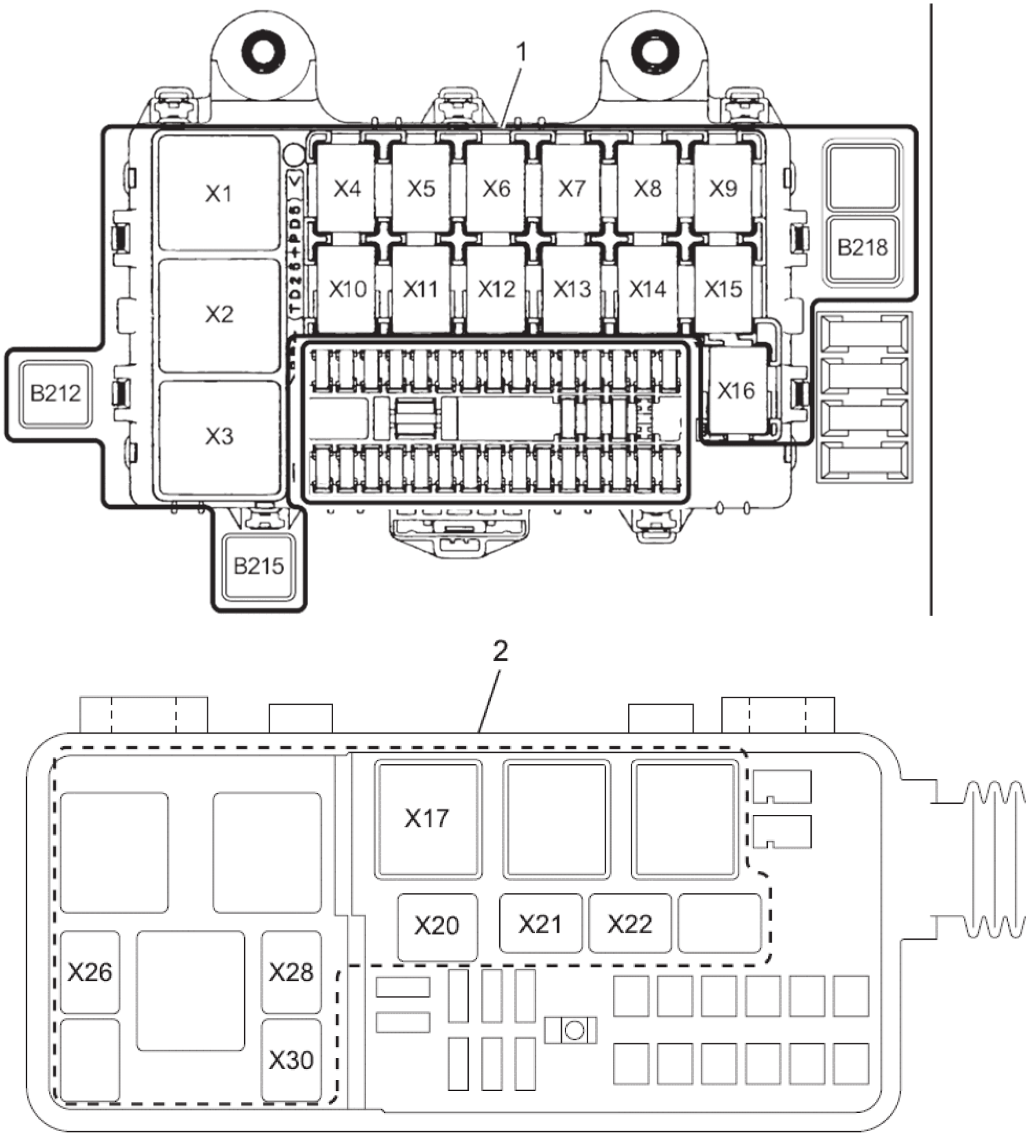
Relay Location



(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Relay Location


1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
X16
B212
B215
B218
TD26+PD5
2
X17
X20
X21
X22
X26
X28
X30

1- fuse box
2- relay box

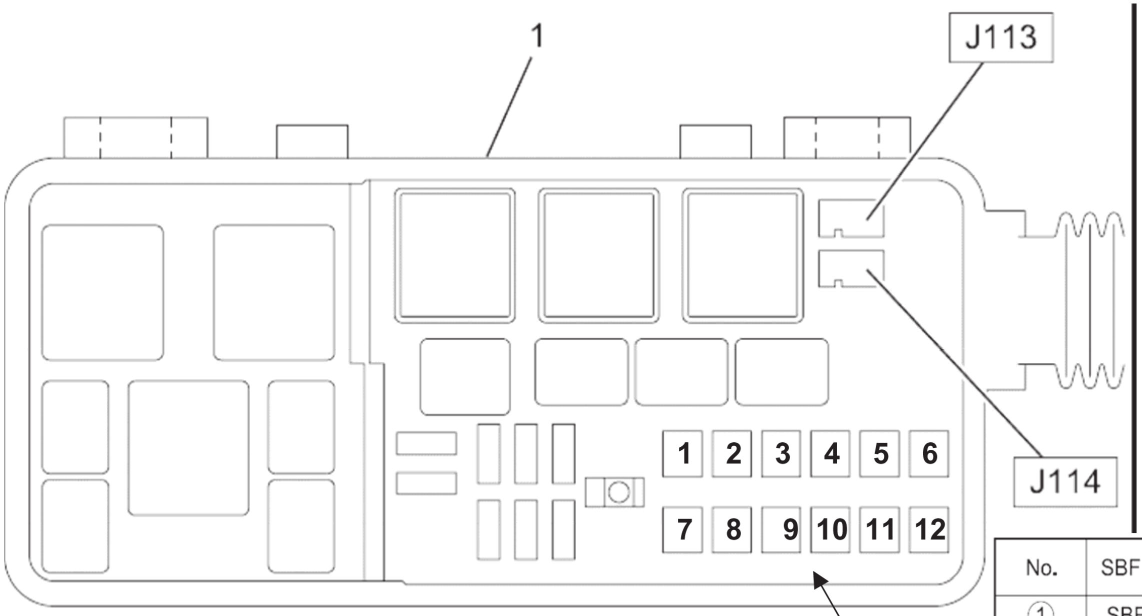
Relay List

Connector #	Relay Name
X1	Stoplight
X2	Day Time Running Light
X3	Key On
X4	TCM
X5	P/N Start
X6	Wiper Main
X7	Horn
X8	Wiper HI/LO
X9	-
X10	Rear Power Window
X11	Charge
X12	Front Power Window
X13	Headlight(Lo)
X14	Vacuum Pump
X15	Headlight(Hi)
X16	Tail Light
X17	Starter
X20	Magnetic Clutch
X21	Condenser Fan
X22	Rear Dome Light
X26	Marker Lamp
X28	Exhaust Brake Cut
X30	ECM Main
B212	Accesory Power
B215	Blower
B218	Cigar lighter

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Slow Blow Fuse and Diode Chart



No.	SBF No.	Name	Capacity
①	SBF1	ECM	30A
②	SBF2	STARTER	60A
③	SBF3	POWER ACC	50A
④	SBF4	GLOW	60A
⑤	SBF5	AM2	40A
⑥	SBF6	AM1	30A
⑦	SBF7	HVAC	40A
⑧	SBF8	HEADLIGHT	30A
⑨	SBF9	RR DOME LIGHT	30A
⑩	SBF10	WIPER	50A
⑪	SBF11	ABS	60A
⑫	SBF12	J/B-B	50A

Diode Table

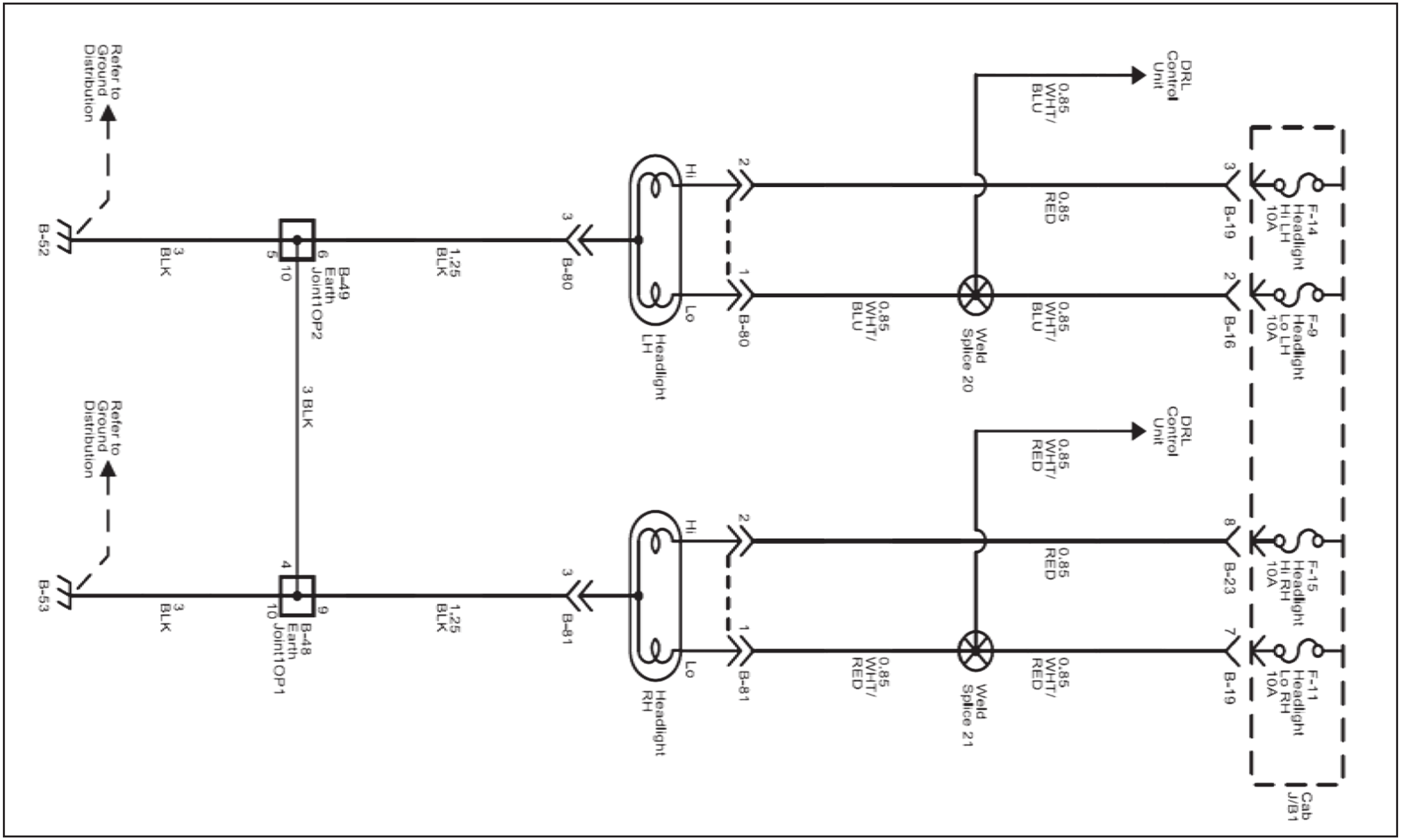
6

Connector #	Diode Name
J113	ECM
J114	A/C

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Headlights


Refer to Ground Distribution
B-52
3 BLK
5
10
6
B-49 Earth Joint1OP2
1.25 BLK
3
B-80
3 BLK
Hi
Lo
Headlight LH
2
1
B-80
0.85 WHT/ BLU
Weld Splice 20
0.85 RED
0.85 WHT/ BLU
DRL Control Unit
3
B-19
2
B-16
F-14 Headlight Hi LH 10A
F-9 Headlight Lo LH 10A
Refer to Ground Distribution
B-53
3 BLK
4
10
9
B-48 Earth Joint1OP1
1.25 BLK
3
B-81
Hi
Lo
Headlight RH
2
1
B-81
0.85 WHT/ RED
Weld Splice 21
0.85 RED
0.85 WHT/ RED
DRL Control Unit
8
B-23
7
B-19
F-15 Headlight Hi RH 10A
F-11 Headlight Lo RH 10A
Cab J/B1

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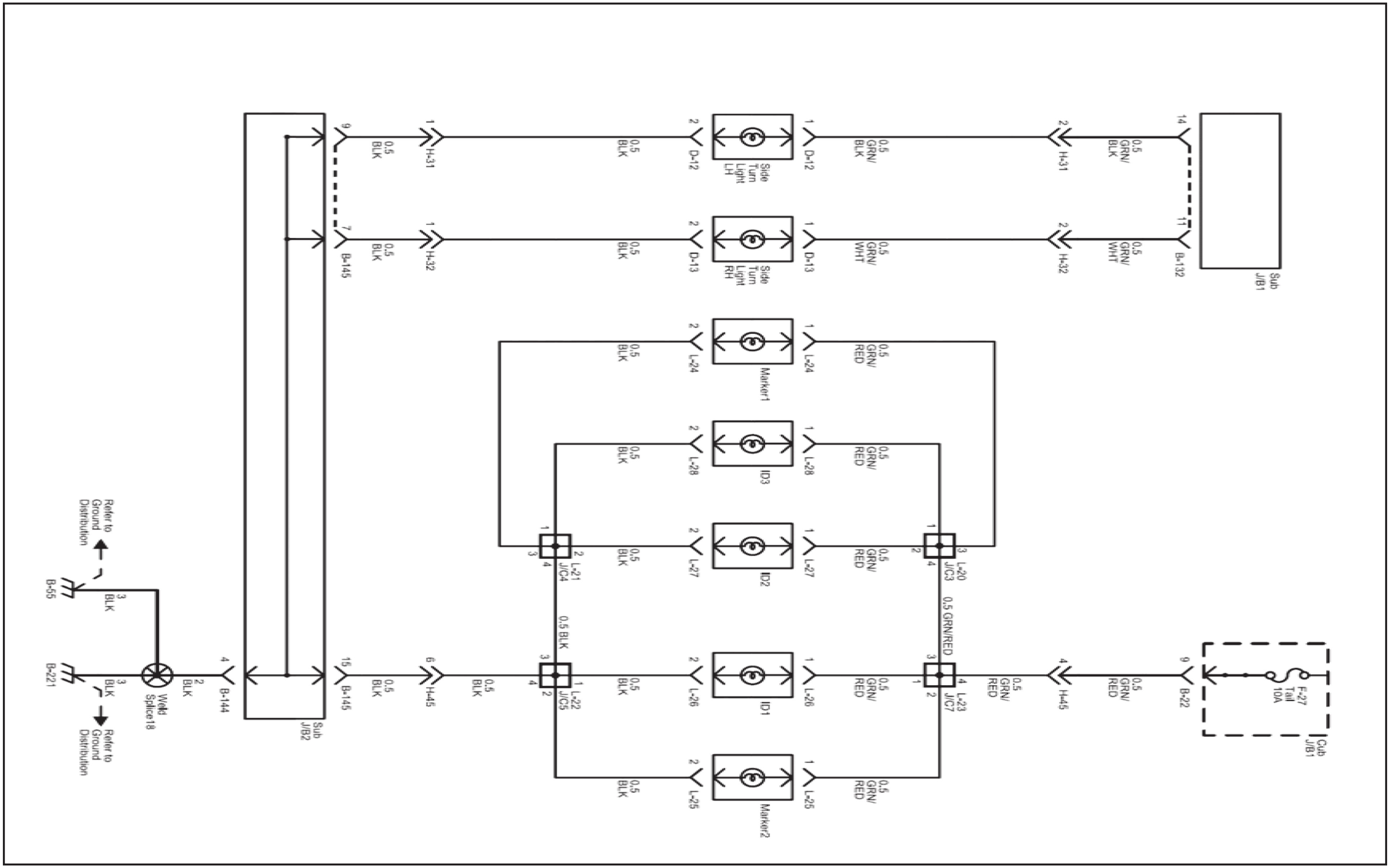
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

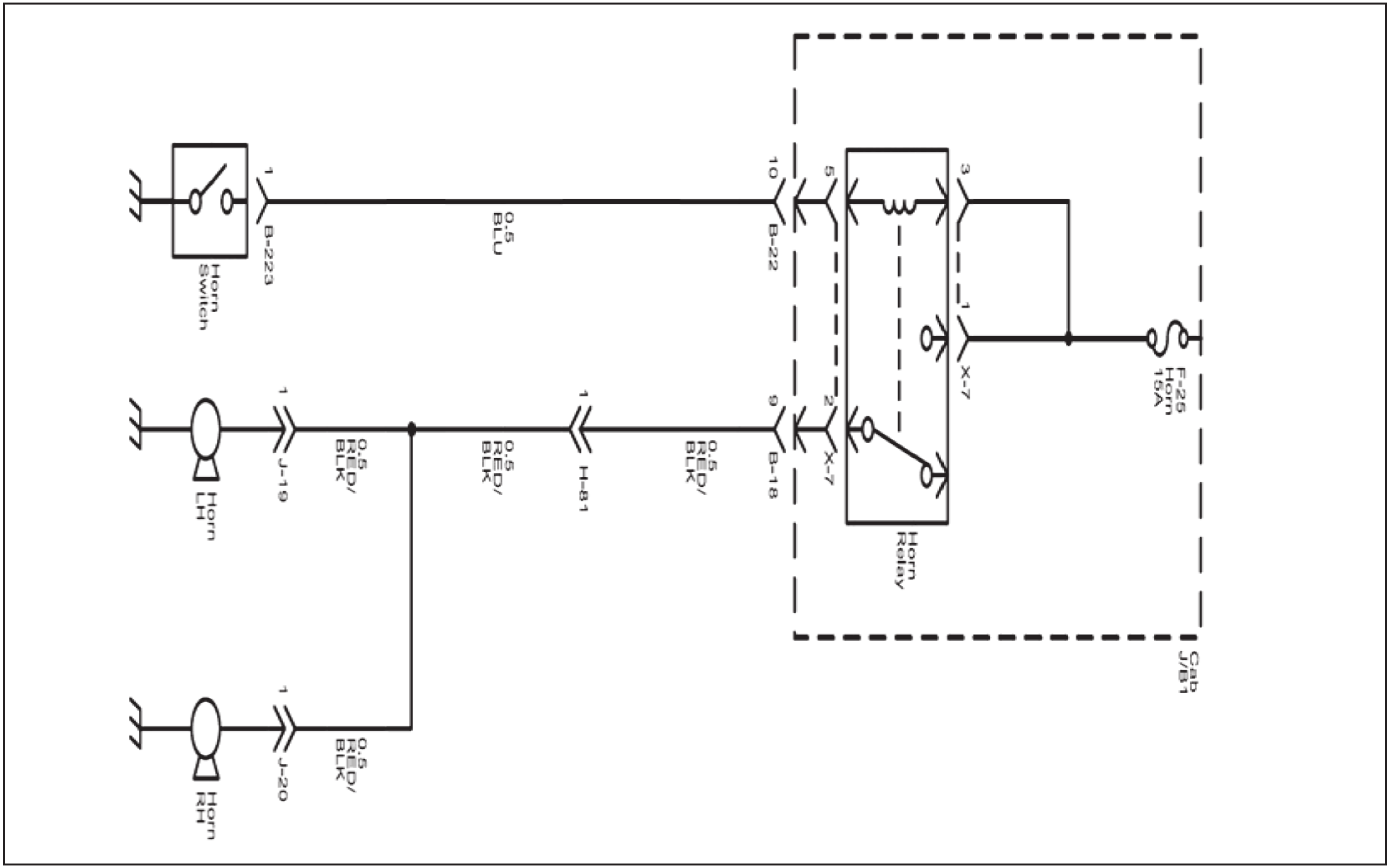
Marker Lights and ID Lights


Sub J/B2
Sub J/B1
Side Turn Light LH
Side Turn Light RH
Marker1
ID3
ID2
ID1
Marker2
F-27 Tail 10A
Weld Splice18
Refer to Ground Distribution
Refer to Ground Distribution
B-55
B-221
B-144
B-145
B-132
B-22
H-31
H-32
H-45
D-12
D-13
L-24
L-28
L-27
L-26
L-25
L-20 J/C3
L-21 J/C4
L-22 J/C5
L-23 J/C7
0.5 BLK
0.5 GRN/BLK
0.5 GRN/WHT
0.5 GRN/RED
2 BLK
3 BLK

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

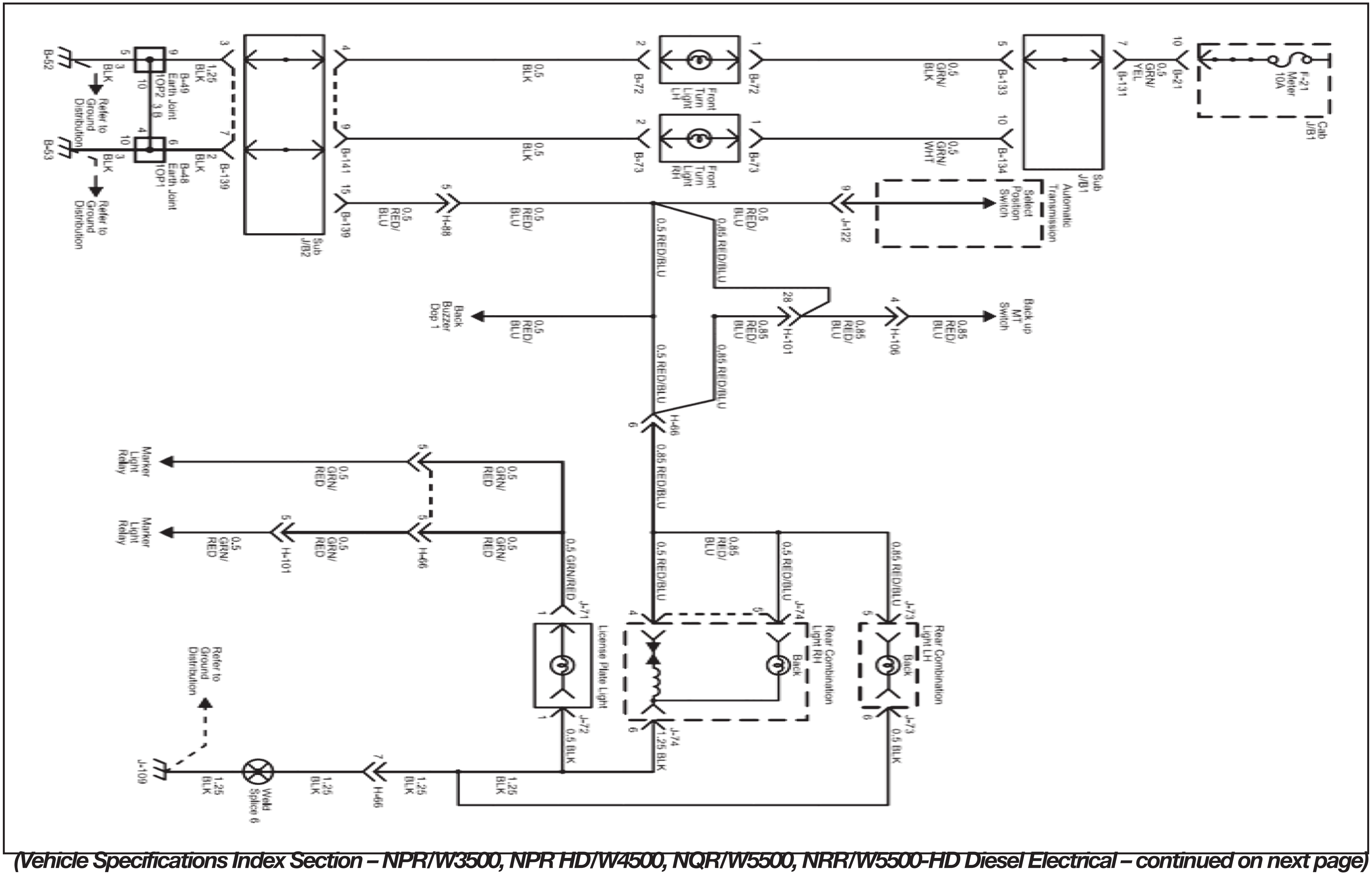
Horns


Horn Switch
1
B-223
0.5 BLU
10
B-22
5
3
1
X-7
F-25 Horn 15A
Horn Relay
Cab J/B1
Horn LH
1
J-19
0.5 RED/BLK
0.5 RED/BLK
1
H-81
0.5 RED/BLK
9
B-18
2
X-7
Horn RH
1
J-20
0.5 RED/BLK

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

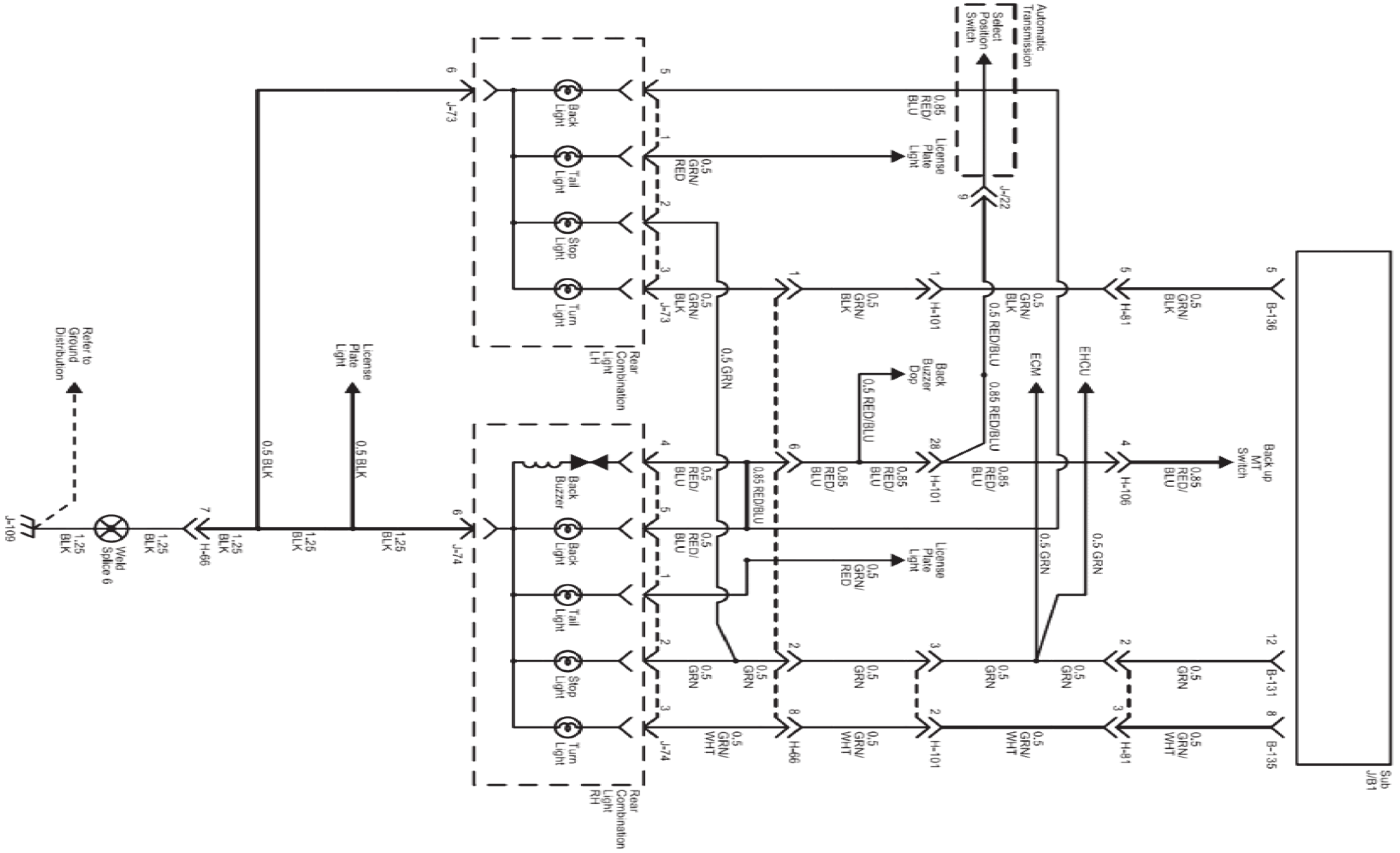
Turn Signals Front


B-52
B-53
Refer to Ground Distribution
1OP2 3.B Earth Joint
B-49
B-48 Earth Joint 1OP1
Sub J/B2
B-139
B-141
H-88
Front Turn Light LH
Front Turn Light RH
B-72
B-73
B-133
B-134
Sub J/B1
B-131
B-21
F-21 Meter 10A
Cab J/B1
Automatic Transmission Select Position Switch
J-122
Back Buzzer Dop 1
H-101
H-106
Back up MT Switch
H-66
Marker Light Relay
J-71
License Plate Light
J-72
J-74
Rear Combination Light RH
Back
J-73
Rear Combination Light LH
J-109
Weld Splice 6

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

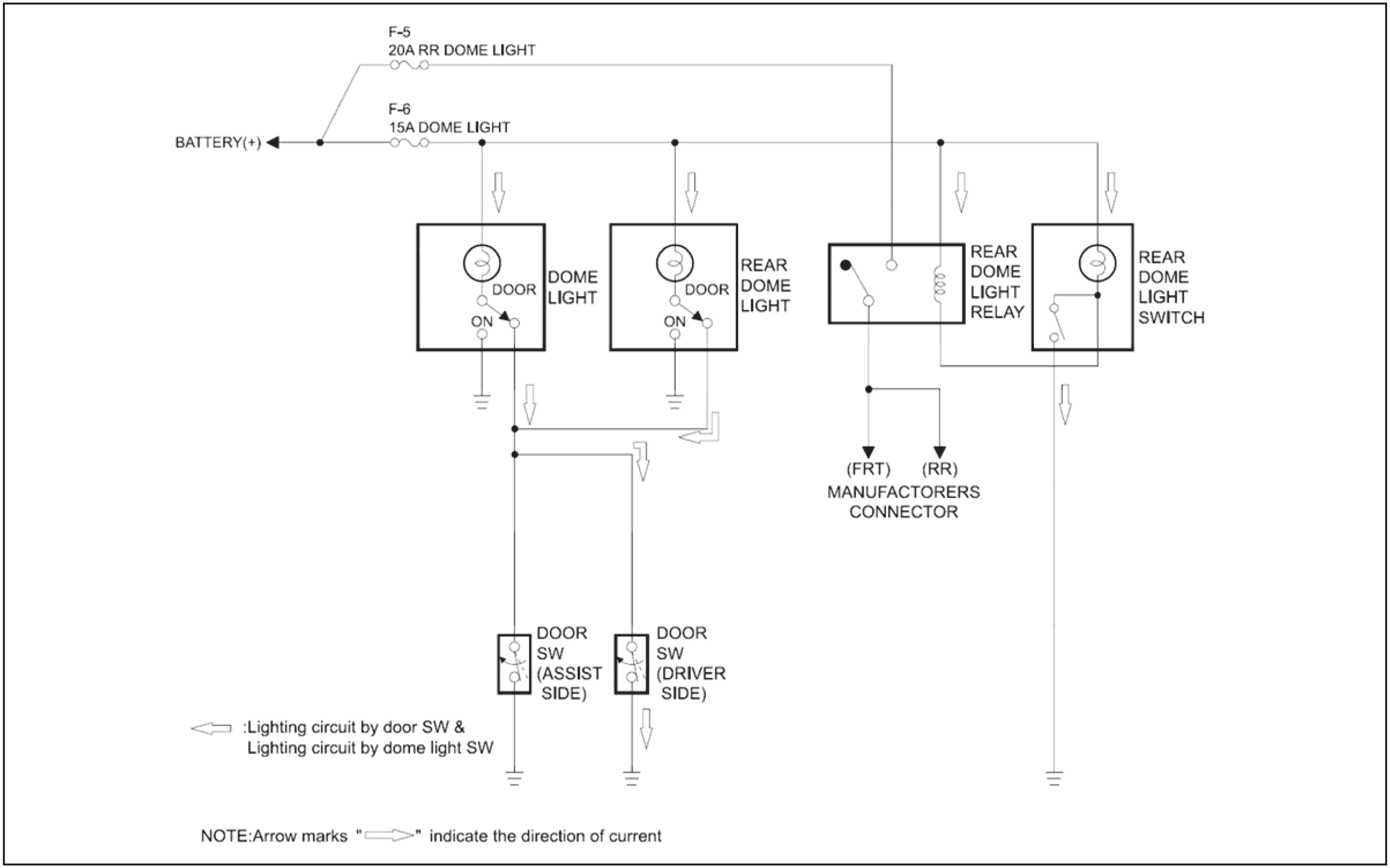
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Turn Signals Rear and Back Buzzer Circuit


Automatic Transmission Select Position Switch
J-22
License Plate Light
0.85 RED/BLU
0.5 GRN/RED
Back Light
Tail Light
Stop Light
Turn Light
J-73
Rear Combination Light LH
0.5 GRN/BLK
0.5 GRN
0.5 RED/BLU
0.85 RED/BLU
H-101
H-81
B-136
ECM
EHCU
Back Buzzer Dop
Back up MT Switch
H-106
Sub J/B1
Refer to Ground Distribution
J-109
1.25 BLK
Weld Splice 6
H-66
0.5 BLK
J-74
Back Buzzer
Rear Combination Light RH
0.5 RED/BLU
0.85 RED/BLU
0.5 GRN
0.5 GRN/WHT
B-131
B-135

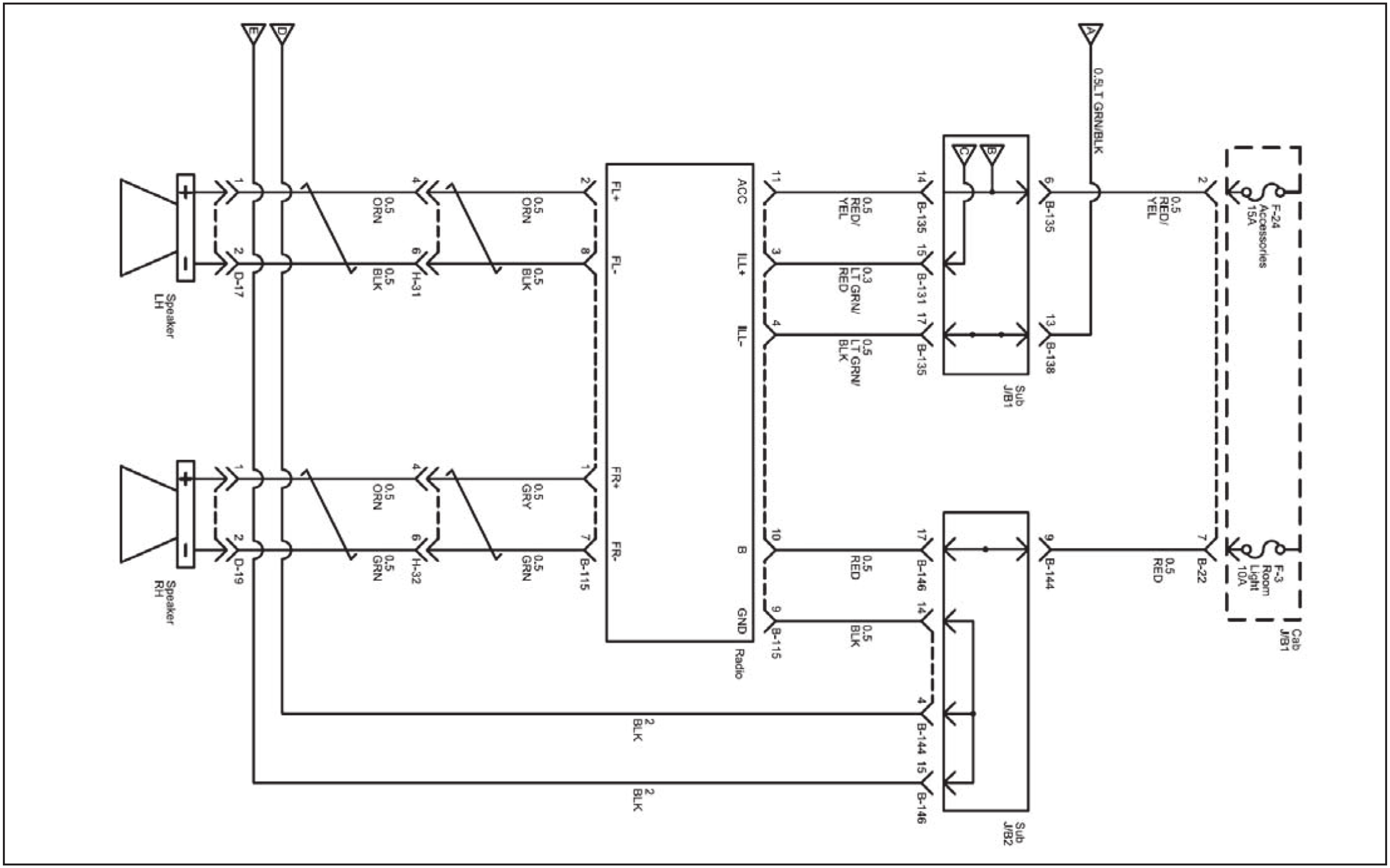
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

Cab Interior Lights & Body Connectors


F-5
20A RR DOME LIGHT
F-6
15A DOME LIGHT
BATTERY(+)
DOOR
ON
DOME LIGHT
DOOR
ON
REAR DOME LIGHT
REAR DOME LIGHT RELAY
REAR DOME LIGHT SWITCH
(FRT)
(RR)
MANUFACTORERS CONNECTOR
DOOR SW (ASSIST SIDE)
DOOR SW (DRIVER SIDE)
:Lighting circuit by door SW &
Lighting circuit by dome light SW
NOTE:Arrow marks " " indicate the direction of current

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Radio Circuits


E
D
A
0.5LT GRN/BLK
C
B
Speaker LH
Speaker RH
D-17
D-19
1
2
0.5 ORN
0.5 BLK
4
6
H-31
H-32
0.5 ORN
0.5 BLK
0.5 GRN
0.5 GRY
0.5 GRN
2
8
1
7
B-115
FL+
FL-
FR+
FR-
ACC
ILL+
ILL-
B
GND
Radio
11
3
4
10
9
B-115
0.5 RED/ YEL
0.3 LT GRN/ RED
0.5 LT GRN/ BLK
0.5 RED
0.5 BLK
14 B-135
15 B-131
17 B-135
17 B-146
14
4 B-144
15 B-146
Sub J/B1
Sub J/B2
6 B-135
13 B-138
9 B-144
0.5 RED/ YEL
0.5 RED
2
7 B-22
F-24 Accessories 15A
F-3 Room Light 10A
Cab J/B1
2 BLK
2 BLK

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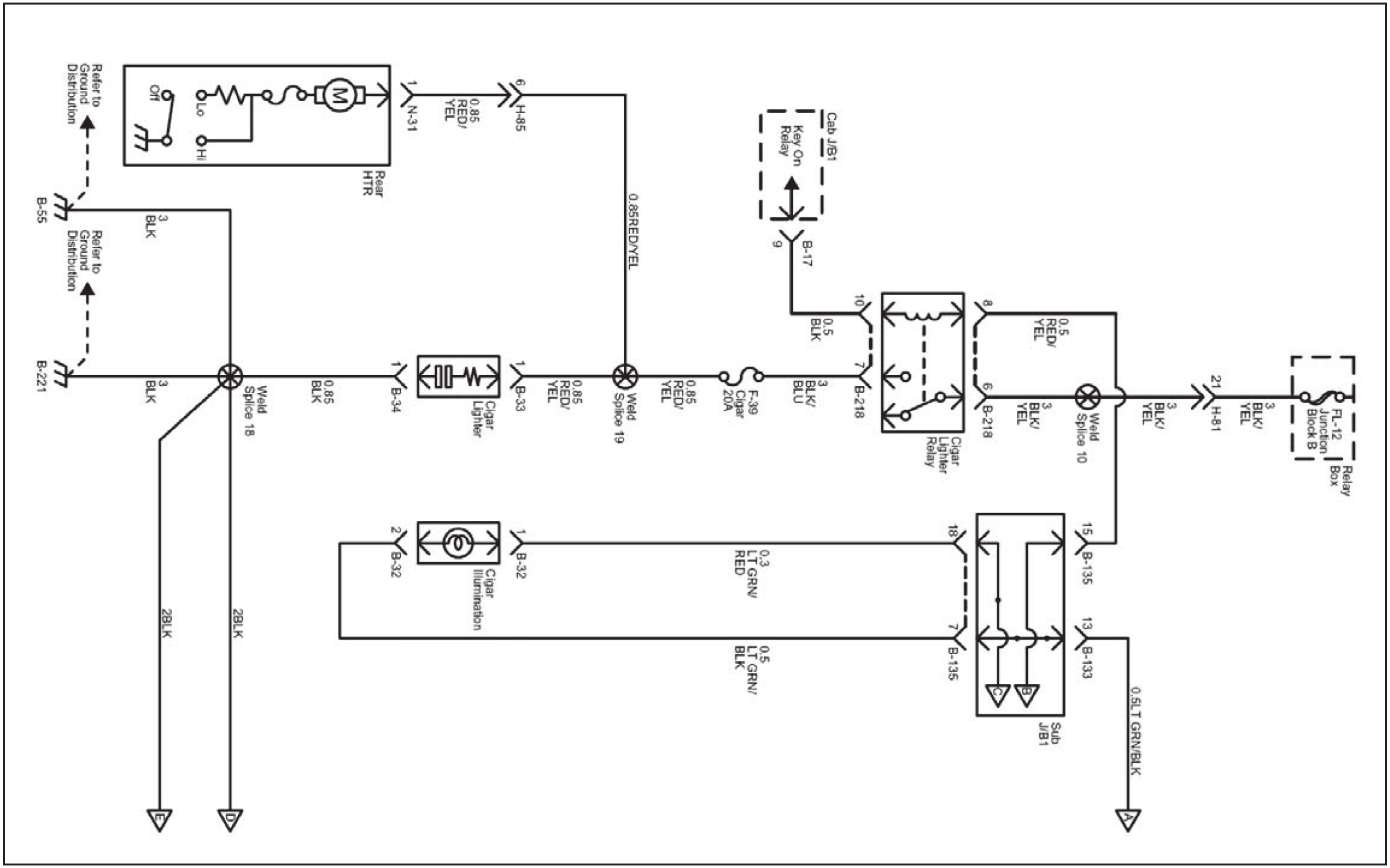
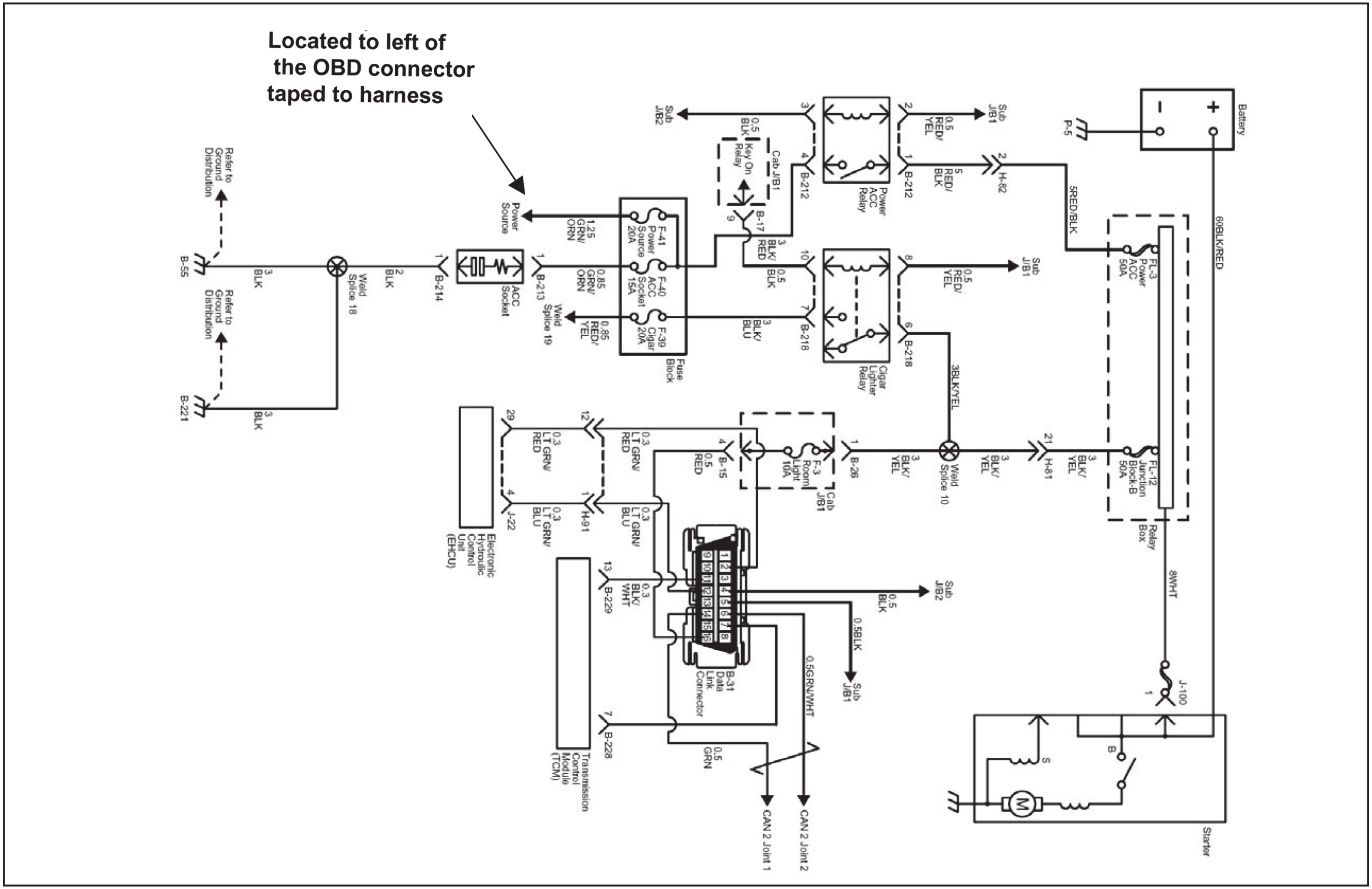
(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Cigar Lighter Circuits


Refer to Ground Distribution
Off
Lo
Hi
Rear HTR
1
N-31
0.85 RED/ YEL
6
H-85
0.85RED/YEL
B-55
3 BLK
Refer to Ground Distribution
B-221
3 BLK
Weld Splice 18
0.85 BLK
1
B-34
Cigar Lighter
1
B-33
0.85 RED/ YEL
Weld Splice 19
0.85 RED/ YEL
F-39 Cigar 20A
3 BLK/ BLU
7
B-218
Cab J/B1
Key On Relay
9
B-17
10
0.5 BLK
Cigar Lighter Relay
8
0.5 RED/ YEL
6
B-218
3 BLK/ YEL
Weld Splice 10
3 BLK/ YEL
21
H-81
3 BLK/ YEL
FL-12 Junction Block B
Relay Box
2
B-32
Cigar Illumination
1
B-32
0.3 LT GRN/ RED
18
7
B-135
0.5 LT GRN/ BLK
15
B-135
13
B-133
0.5LT GRN/BLK
Sub J/B1
C
B
2BLK
2BLK
E
D
A

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

Auxiliary Power Source Circuit Diagram

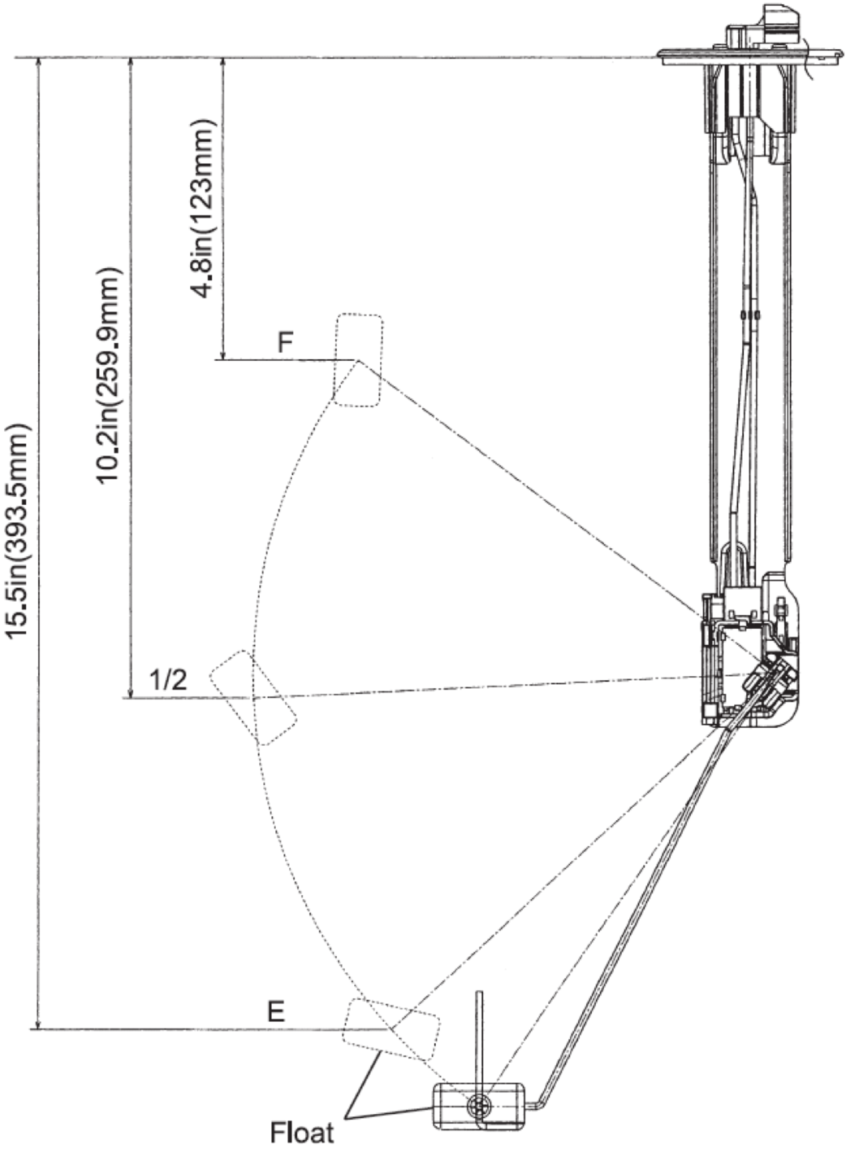


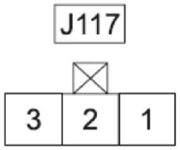
Located to left of the OBD connector taped to harness

Battery
P-5
60BLK/RED
5RED/BLK
H-82
Sub J/B1
0.5 RED/YEL
5 RED/BLK
Power ACC Relay
B-212
Sub J/B2
0.5 BLK
Cab J/B1
Key On Relay
B-17
3 BLK/RED
0.5 BLK
Cigar Lighter Relay
B-218
3 BLK/BLU
3BLK/YEL
Fuse Block
F-41 Power Source 20A
F-40 ACC Socket 15A
F-39 Cigar 20A
Power Source
1.25 GRN/ORN
0.85 GRN/ORN
0.85 RED/YEL
Weld Splice 19
ACC Socket
B-213
B-214
2 BLK
Weld Splice 18
3 BLK
B-55
B-221
Refer to Ground Distribution
Relay Box
FL-3 Power ACC 50A
FL-12 Junction Block-B 50A
H-81
3 BLK/YEL
Weld Splice 10
B-26
F-3 Room Light 10A
B-15
0.5 RED
0.3 LT GRN/RED
0.3 LT GRN/BLU
H-91
J-22
Electronic Hydraulic Control Unit (EHCU)
B-229
0.3 BLK/WHT
B-228
Transmission Control Module (TCM)
B-31 Data Link Connector
0.5 BLK
0.5BLK
0.5GRN/WHT
0.5 GRN
CAN 2 Joint 1
CAN 2 Joint 2
8WHT
J-100
Starter
B
S
M

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Fuel Tank Sending Unit Resistance (In-Frame Tank)


4.8in(123mm)
10.2in(259.9mm)
15.5in(393.5mm)
F
1/2
E
Float

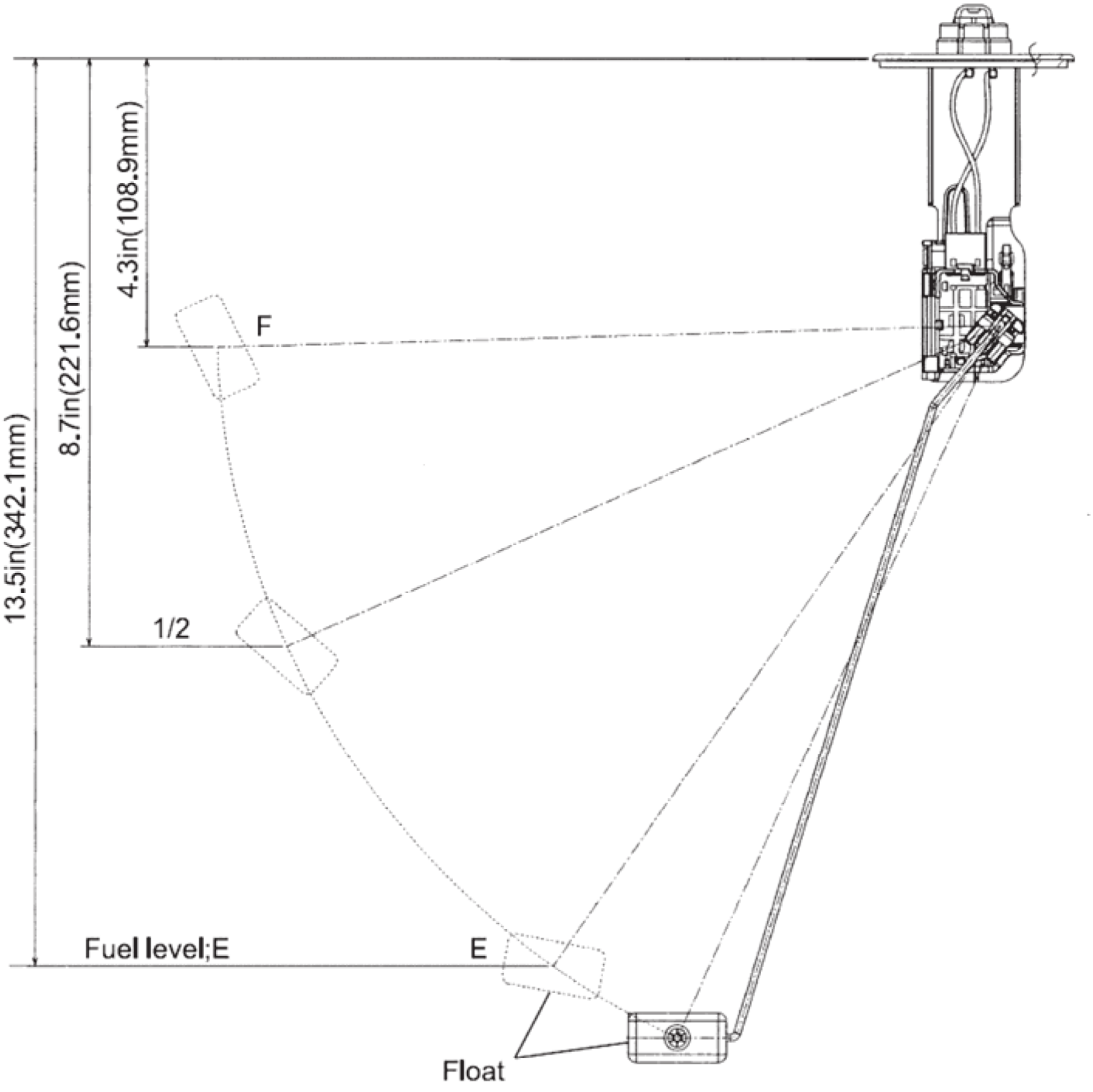


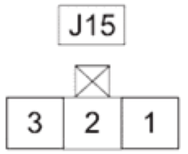
Float Position	Resistance value(Ω)
F	14
1/2	44
E	100

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued from previous page)

Fuel Tank Sending Unit Resistance (Side-Mounted Tank)


13.5in(342.1mm)
8.7in(221.6mm)
4.3in(108.9mm)
F
1/2
Fuel level;E
E
Float



Float Position	Resistance value(Ω)
F	14
1/2	44
E	100

(Vehicle Specifications Index Section – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical – continued on next page)

PTO SECTION FOR THE 4HK1-TC ENGINE (IR6)

System Operating Instructions
PTO – Power Take Off Option – Electrical Requirements

SECTION OUTLINE

- ***Overview***
- ***Vocation/Modes***
- ***Factory Installed Equipment***
- ***Upfitter Installed Equipment***
- ***ECM Programmable PTO Functions***
- ***Operation ****
    - ***Stationary Preset Mode***
    - ***Stationary Variable Mode***
    - ***Mobile Variable Mode***

PTO Engine Shutdown
Remote Operation

- ***Appendix***
    - ***Illustrations:***

Location of PTO Switch and Indicator	***ILL#1***
Location of Cruise Control Switches	***ILL#2***
PTO Switch Connector and Harness	***ILL#3***
PTO Switch Harness	***ILL#4***
PTO Harness Connector H104 (8 pin)	***ILL#5***
PTO Harness Connector H105 (10 pin)	***ILL#6***
PTO Harness 1 and 2 Wiring Harness	***ILL#7***
PTO Harness 1 and 2 Wiring Diagram	***ILL#8***
PTO Harness 1 and 2 Wiring Diagram	***ILL#9***

OVERVIEW

A Power Take Off (PTO) is a gearbox or mechanical device used to transmit mechanical power from the power train, through gears or a transmission, to another mechanical or hydraulic device. Examples of PTO applications are: salt spreaders; refuse equipment, plows, pumps, drills, lifts, wrecker equipment, dump bodies, fire/rescue equipment.

PTO Advantages

- PTO's are inexpensive, convenient, safe and reliable.
- PTO's bolt on to the transmission, engine, transfer case or can be incorporated into the accessory belt drive system.
- PTO's eliminate the need for a complex array of levers, controllers, electric motors, which would be required to duplicate the operation of a PTO.

Scope
The Upfitter or Specialty Vehicle Assembler installs the PTO unit itself on the vehicle. The (PTO) option described here is the necessary electrical and electronic content to control the PTO unit. Responsibility for proper and safe operation remains with the Upfitter.

(PTO) Option (ILL#9, ILL#10)
The (PTO) option allows for increased engine speed for increased power to the PTO unit.

VOCATION/MODES

The primary difference in PTO operation is whether the vehicle is stationary or moving. Stationary operation can have either preset or variable PTO speeds. Some examples of modes and vocations are:

- Stationary Preset – Two preset high idle speeds – Refuse & Wrecker equipment, Fire truck pumpers
- Stationary Variable – Variable high idle speeds – Drills, Lifts
- Mobile Variable – Allows variable PTO speeds while the vehicle is moving – Salt Spreaders, Plows, Street Cleaners

Note: The ECM (ENGINE CONTROL MODULE) can be programmed to only one of these modes at any given time.

FACTORY INSTALLED EQUIPMENT

The factory PTO option includes the PTO Enable Switch, PTO Engine Speed Control switch,Cruise Control Switches, and upfitter connectors to allow optional upfitter installed switches, and wiring.

UPFITTER INSTALLED EQUIPMENT

Optional upfitter capabilities include: remote PTO enable switch, remote PTO UP switch, remote PTO DOWN switch, PTO cab cruise switch disable, and PTO engine shutdown switch. All of these controls interface through the upfitter connectors.

ECM PROGRAMMABLE FUNCTIONS

Optional upfitter capabilities that can be activated by reprogramming the ECM at your authorized dealer. These include: Remote PTO Throttle, Remote PTO UP, Remote PTO DOWN, Remote PTO Set Speed A Switch, Remote PTO Set Speed B Switch, PTO Engine Shutdown, PTO Load Engaged, and PTO Ignore Brake/Clutch

OPERATION

Description
The PTO controls allow the user to raise the engine speed through the use of designated switches and ECM programming.
The ECM can be programmed to one of the following three PTO modes:

- Stationary Preset mode – Two preset high idle speeds. Vehicle must be stationary. (Factory standard mode)
- Stationary Variable mode – Variable high idle speeds. Vehicle must be stationary.
- Mobile Variable mode – Allows variable PTO speeds while vehicle is moving.

These PTO modes are addressed separately and in detail in the following pages.
Please note the ECM can be programmed to only one of the three modes at any one time.

PTO Switches
Vehicles ordered with the PTO switch option (IL9, IL10) come with instrument panel mounted switches, which allows the user to enable the PTO function and control the engine speed. These PTO switches are located on the left of the dash as shown in the illustration 1. An indicator in the PTO enabled switch illuminates to show PTO mode is active. The engine speed can then be changed with either the PTO Engine Speed Control switch or upfitter installed remote PTO switches. Cruise Control Switches come standard with the 2008 GM/Isuzu W and N series chassis as shown in illustration 2.
The following chart illustrates switch operation.

PTO SWITCH DESCRIPTION

Switch	Stationay Preset	Stationary Variable	Mobile Variable
PTO Enable (Factory Option)	Enables PTO Mode	Enables PTO Mode	Enables PTO Mode
Remote PTO Enable	Enables PTO Mode	Enables PTO Mode	Enables PTO Mode
PTO EngineSpeedControl(FactoryOption)	Allows 2nd/1st Preset Speed	Increases/Decreases engine speed variably or incrementally	Increases/Decreases engine speed variably or incrementally
Cruise Res/Set (Factory) (Same ECM input as PTO Up/Down)	Allows 2nd/1st Preset Speed	Increases/Decreases engine speed variably or incrementally	Increases/Decreases engine speed variably or incrementally
Remote PTO Down (Same ECM input as PTO Up/Down)	Allows 1st Preset Speed	Decreases engine speed variably or incrementally	Decreases engine speed variably or incrementally
Remote PTO Up (Same ECM input as PTO Up/Down)	Allows 2nd Preset Speed	Increases engine speed variably or incrementally	Increases engine speed variably or incrementally
PTO Cab Control Switches Disable	The PTO Up/Down switch inputs are ignored when this swith is ON.	The PTO Up/Down switch inputs are ignored when this swith is ON.	The PTO Up/Down switch inputs are ignored when this swith is ON.
Accelerator Pedal(Factory)	Not Applicable	Increases engine speed variably	Increases engine speed variably
** Remote PTO Throttle	Not Applicable	Increases or decreases engine speed variably or incrementally	Increases or decreases engine speed variably or incrementally
** Remote PTO Down	Not Applicable	Decreases engine speed variably or incrementally	Decreases engine speed variably or incrementally
** Remote PTO Up	Not Applicable	Increases engine speed variably	Increases engine speed variably
** Remote PTO Set Speed A	Allows for 1st Preset Speed	Not Applicable	Not Applicable
** Remote PTO Set Speed B	Allows for 2nd Preset Speed	Not Applicable	Not Applicable
** PTO Engine Shutdown	Allows for engine shutdown in PTO Mode	Allows for engine shutdown in PTO Mode	Allows for engine shutdown in PTO Mode
** PTO Load Engaged	Inhibits PTO mode until PTO relay and this switch is turned on.	Inhibits PTO mode until PTO relay and this switch is turned on.	Inhibits PTO mode until PTO relay and this switch is turned on.
** PTO Ignore Brake/Clutch	PTO Mode stays active with a brake or clutch switch input.	PTO Mode stays active with a brake or clutch switch input.	PTO Mode stays active with a brake or clutch switch input.

** Denotes the need for ECM reprograming

STATIONARY PRESET MODE

Description
The Stationary Preset Mode allows the user to select from two high idle speeds that are programmed in the ECM. The user can toggle between 2 preset speeds using the PTO Engine Speed Control switch, Cruise Control switch, Cruise Resume/Set switch, or the Remote PTO Switches.

How To Operate
Prior to enabling the Stationary Preset PTO Mode, the following conditions must be met:
1. Engine must be running.
2. Transmission must be in Park or Neutral.
3. Vehicle speed must be less than 5 mph.
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary Preset PTO mode by the following sequence:

1. Set the Park Brake.
2. Set PTO Enable Switch to On position.

Upon Completion of the above steps, the PTO Stationary Preset Mode will be enabled and the engine speed will increase to the PTO Standby speed. Toggling the PTO Egine Speed Control Switch or Cruise Resume/Set switch will cause the engine RPM to change from PTO standby speed to either the PTO Preset #1 or PTO Preset #2 speed depending on which switch is pressed first.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Preset Mode causing the engine to return to normal base idle speed.

Note:
4HK1-TC engine (IR6) will be governed to PTO Max engine speed with throttle activation. Engine speed will return to pre-activation value after the pedal is released.

The factory preset and minimum and maximum programmable speeds are shown in the table below for the 4HK1-TC engine (IR6):

STATIONARY PRESET MODE (Default)

MAIN FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300
PTO SET SPEED	RPM	1300	750-3050
PTO RESUME SPEED	RPM	1700	750-3050

ADDITIONAL FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	———
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	———
PTO ENGINE SHUTDOWN	YES/NO	NO	———
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	———
PTO REMOTE PRESET A/B SWITCH	YES/NO	YES	———

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Tech 2 software

Adjusting the Factory Preset Engine Speed
The above parameters can be reprogrammed with a Tech 2 Diagnostic tool or the service programming system.

STATIONARY VARIABLE MODE

Description
The Stationary Variable Mode allows the user to retain the engine speed at a desired value through the use of the accelerator pedal and PTO Engine Speed Control switch or Cruise Resume/Set switch. The engine speed must be greater than the PTO standby speed and lower than the maximum engine speed.

How To Operate
Prior to enabling the Stationary Variable PTO Mode, the following conditions must be met:

1. Engine must be running
2. Transmission must be in Park or Neutral
3. Vehicle speed must be less than 5 mph
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary Variable PTO Mode by the following sequence:

1. Set the Park Brake.
2. Set PTO Enable Switch to On position.
3. Depress the Accelerator pedal to obtain the desired high idle speed.
4. Press the PTO Engine Speed Control switch or Cruise Resume/Set switch to Set position to hold engine at the desired high idle speed.

The PTO Engine Speed Control switch or the Cruise Resume/Set switch can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the following table. The adjustment increments are 25 RPM. This function will also work with the remote switches.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Variable Mode causing the engine to return to normal base idle.

STATIONARY VARIABLE MODE (con't)

STATIONARY VARIABLE MODE

MAIN FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300

ADDITIONAL FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	———
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	———
PTO ENGINE SHUTDOWN	YES/NO	NO	———
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	———
PTO TAP DOWN RATE	RPM	25	25-500
PTO TAP UP RATE	RPM	25	25-500
PTO ACCEL RATE	RPM/128ms	20	25-500
PTO REMOTE SET/RESUME SWITCH	YES/NO	NO	———
PTO REMOTE THROTTLE	YES/NO	NO	———
PTO REMOTE THROTTLE MAX ENGINE SPEED	RPM	2100	0-2300
PTO REMOTE THROTTLE 0%	VOLTS	0.85	0.25-4.75
PTO REMOTE THROTTLE 100%	VOLTS	3.75	0.25-4.75

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Tech 2 software

Adjusting the Factory Preset Engine Speed
The above parameters can be reprogrammed with a Tech 2 Diagnostic tool or the service programming system.

MOBILE VARIABLE MODE

Description
The PTO Mobile Variable Mode allows the driver to maintain a desired engine speed (not vehicle speed) while the vehicle is moving. This feature is available with both manual and automatic transmissions. The engine speed must be greater than the PTO Standby Speed and lower than the PTO Maximum Engine Speed. The Vehicle speed must be less than the Maximum Vehicle Speed Value.

How To Operate
To engage the PTO Mobile Variable Mode, the following conditions must be met in the following order:
1. Engine must be running
2. Transmission must be in gear.
3. Vehicle speed must be less than the Maximum Vehicle Speed
4. Brake or Clutch must not be depressed.
5. PTO Enable Switch must be set to the On position

When the above conditions are met, the operator can activate the Mobile Variable mode by the following sequence:
7. Depress the Accelerator Pedal to obtain the desired engine speed.
8. Press the PTO Engine Speed Control switch (-) side or set the Cruise Resume/Set switch to Set position to hold engine at the desired high idle speed.

The PTO Engine Speed Control switch or the Cruise Resume/Set switch can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the Engine calibration table. The adjustment increments are 25 RPM

MOBILE VARIABLE MODE (con't)

MOBILE VARIABLE MODE

MAIN FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300

ADDITIONAL FUNCTIONS

Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	—
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	—
PTO ENGINE SHUTDOWN	YES/NO	NO	—
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	—
PTO TAP DOWN RATE	RPM	25	25-500
PTO TAP UP RATE	RPM	25	25-500
PTO ACCEL RATE	RPM/128ms	20	25-500
PTO REMOTE SET/RESUME SWITCH	YES/NO	NO	—
PTO REMOTE THROTTLE	YES/NO	NO	—
PTO REMOTE THROTTLE MAX ENGINE SPEED	RPM	2100	0-2300
PTO REMOTE THROTTLE 0%	VOLTS	0.85	0.25-4.75
PTO REMOTE THROTTLE 100%	VOLTS	3.75	0.25-4.75
PTO MAXIMUM VEHICLE SPEED	MPH	75	0-75

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Tech 2 software

.

Adjusting the Factory Preset Engine Speed
The above parameters can be reprogrammed with a Tech 2 Diagnostic tool or the service programming system.

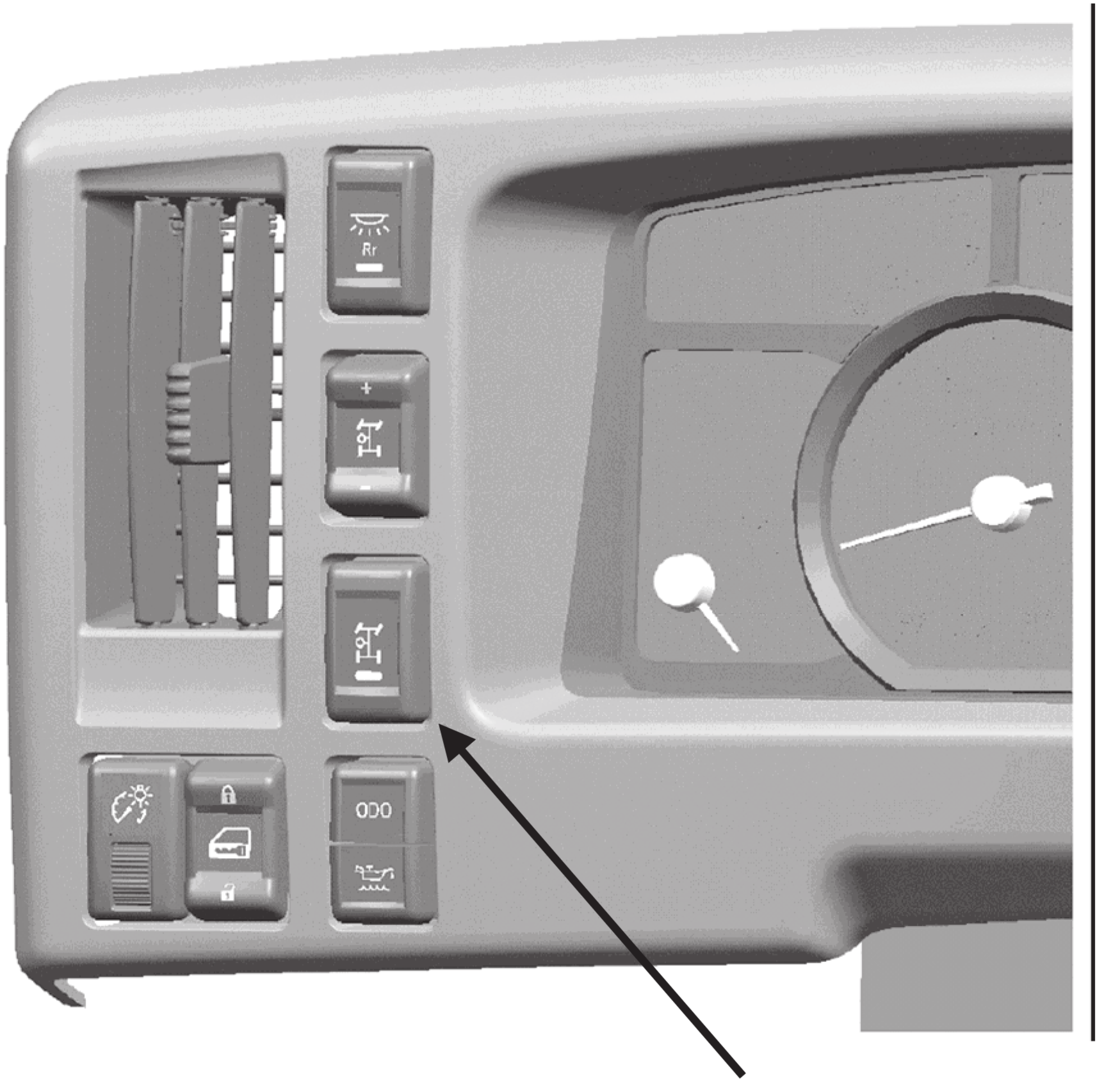
PTO ENGINE SHUTDOWN

Description
The PTO option includes provisions for PTO engine shutdown. This feature allows the operator to stop the engine while in PTO mode with an aftermarket installed switch. If the truck is not in PTO mode, pressing the switch will have no effect on engine operation. The PTO Upfitter Connector (located on the left hand frame rail) has been provided for installation of remote PTO controls. The upfitter can access the PTO engine fault shutdown circuits through this connector. The upfitter must provide the mating connector, wiring, and remote switches. To install this feature see the upfitter provisions schematics. Important. If the PTO engine shutdown feature is to be used, it must be turned on in the ECM. If this feature is not turned on it will have no effect engine operation. The above parameters can be reprogrammed with a Tech 2 Diagnostic tool or the service programming system

REMOTE OPERATION

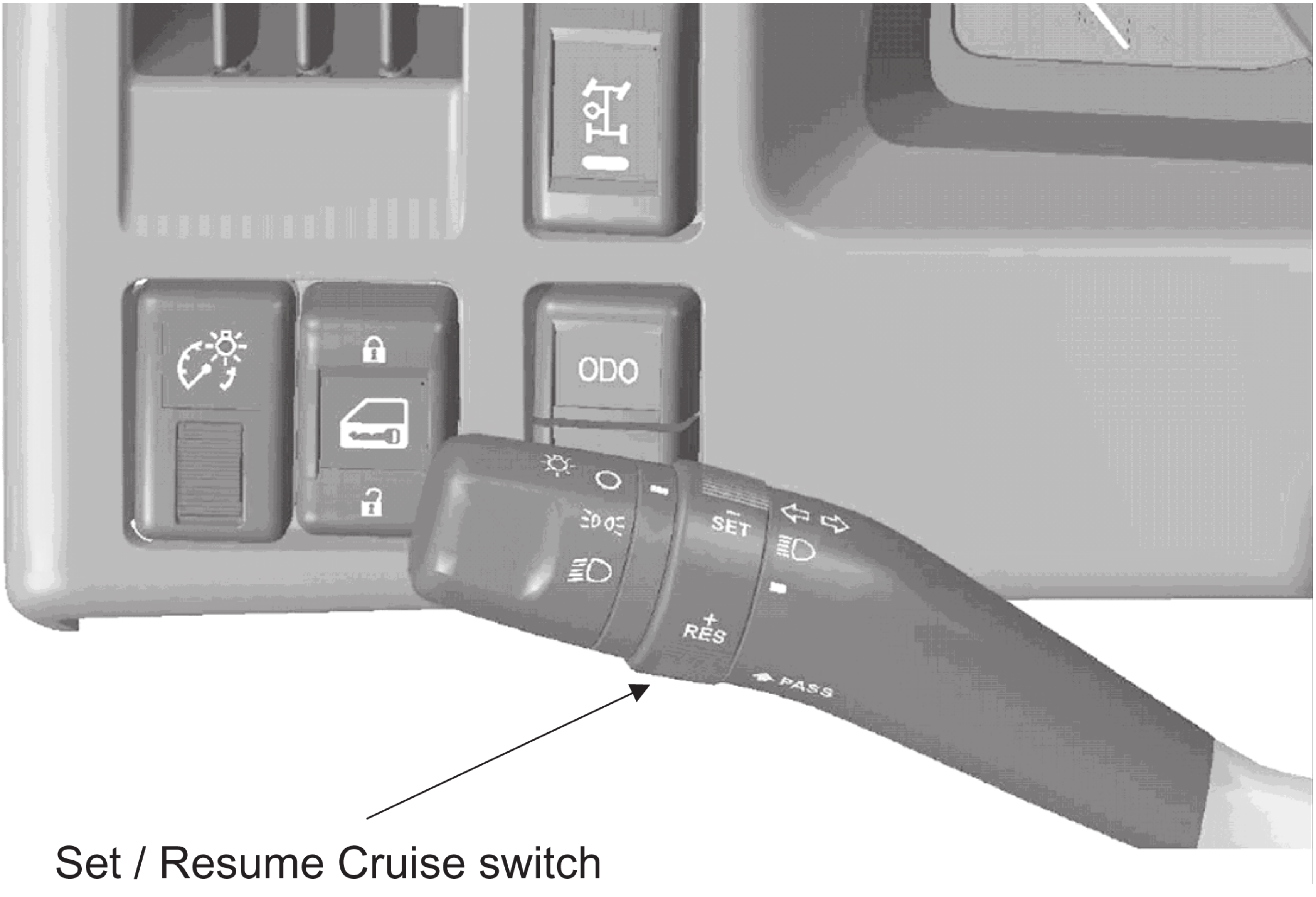
Description
The PTO Upfitter Connector (located on the left hand frame rail) has been provided for installation of remote PTO idle controls. The upfitter can access the PTO high idle circuits through this connector. The upfitter must provide the mating connector, wiring, and remote switches shown on the Upfitter (PTO) Connector. Two momentary switches are required to duplicate the operation of the PTO Engine Speed Control Switch or the Cruise Resume/Set switch in the cab. The schematics showing the switches can be found on the following diagrams. The PTO UP switch duplicates □+□ side of PTO Engine Speed Control switch or the Cruise Resume operation.The PTO Down switch duplicates □-□ side of the PTO Engine Speed Control switch or the Cruise Set operation. Please note that the PTO high idle must still be enabled from the PTO enable switch in the cab or the remote PTO enable switch.

Location of PTO Switch and Indicator – Illustration #1

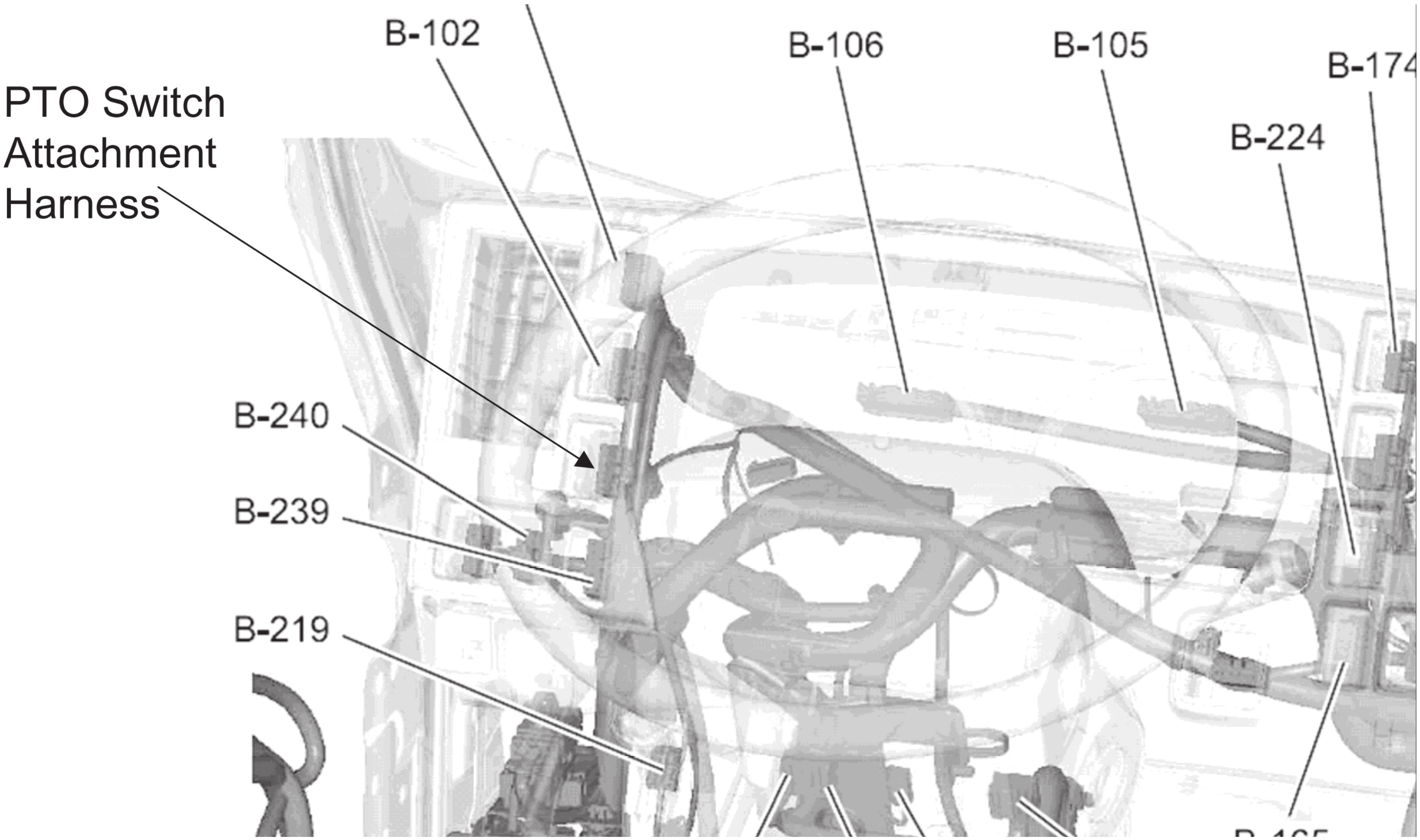


PTO Enable Switch

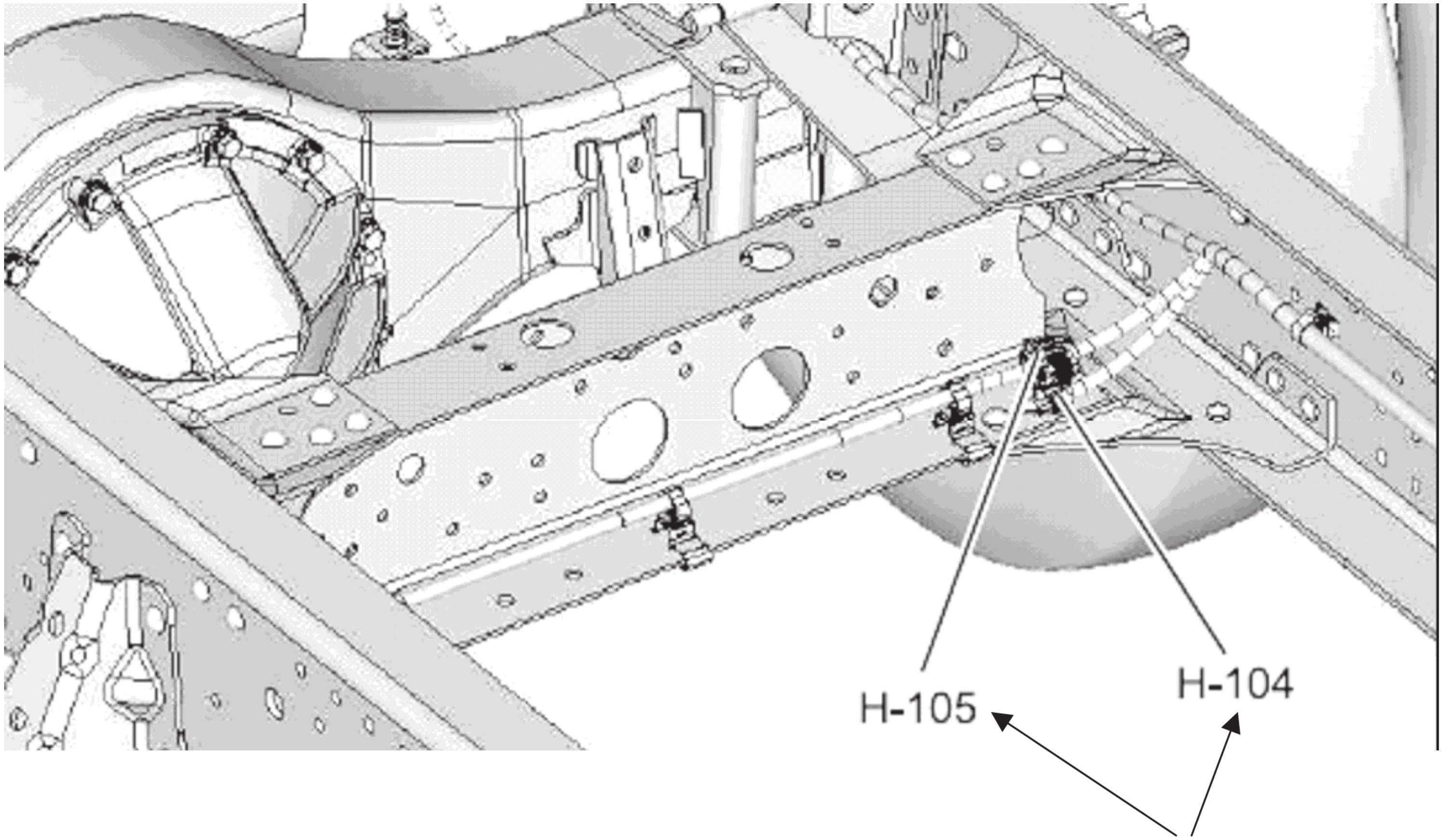
Location of Cruise Control Switches – Illustration #2


ODO
SET
RES
PASS
Set / Resume Cruise switch

PTO Switch Connector and Harness – Illustration #3

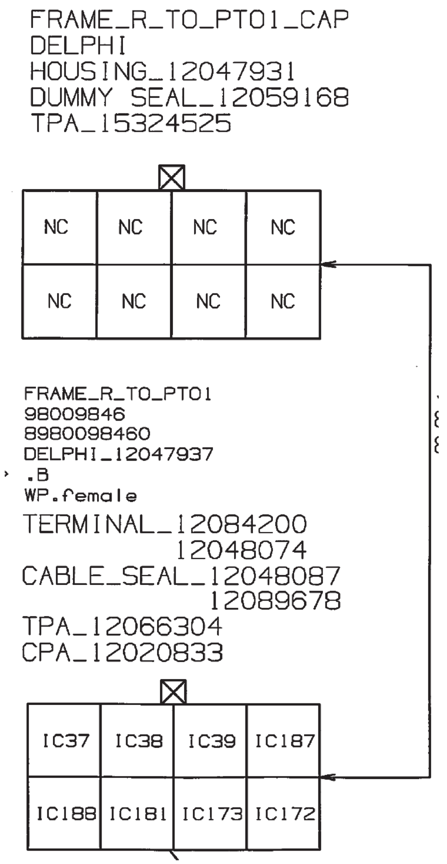

B-102
B-106
B-105
B-174
B-224
PTO Switch Attachment Harness
B-240
B-239
B-219

PTO Switch Harness 1 & 2 – Illustration #4



PTO Harness 1 and 2
on the LH rail to the rear
of the forward suspension
crossmember

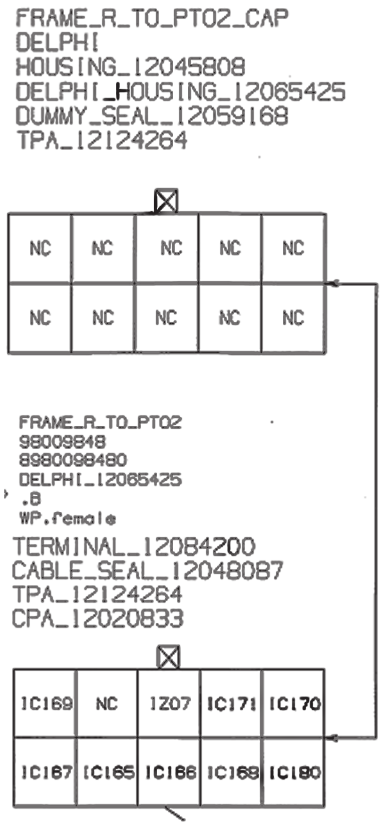
PTO Harness Connector H104 – Illustration #4


FRAME_R_TO_PTO1_CAP
DELPHI
HOUSING_12047931
DUMMY SEAL_12059168
TPA_15324525
NC
NC
NC
NC
NC
NC
NC
NC
FRAME_R_TO_PTO1
98009846
8980098460
DELPHI_12047937
.B
WP.female
TERMINAL_12084200
12048074
CABLE_SEAL_12048087
12089678
TPA_12066304
CPA_12020833
IC37
IC38
IC39
IC187
IC188
IC181
IC173
IC172

PTO 1 CONNECTOR H104				
CIRCUIT NUMBER	WIRE COLOR CODE	WIRING DIAGRAM REFERENCE	WIRING DIAGRAM	WIRING DIAGRAM ECM LABEL
IC37	L	LNW78DXF003901	1	PACL VCC
IC38	Y	LNW78DXF003901	2	PACL
IC39	L/R	LNW78DXF003901	3	PACL GND
IC187	L/O	LNW78DXF003701	4	CRR SW
IC188	L/Y	LNW78DXF003701	5	CRN SW
IC181	P	LNW78DXF003701	6	PWR
IC173	P/G	LNW78DXF003801	7	PTOEN REL
IC172	B/W	LNW78DXF003801	8	PTOFB SW

Harness end parts available from **www.powerandsignal.com**

PTO Harness Connector H105 – Illustration #6

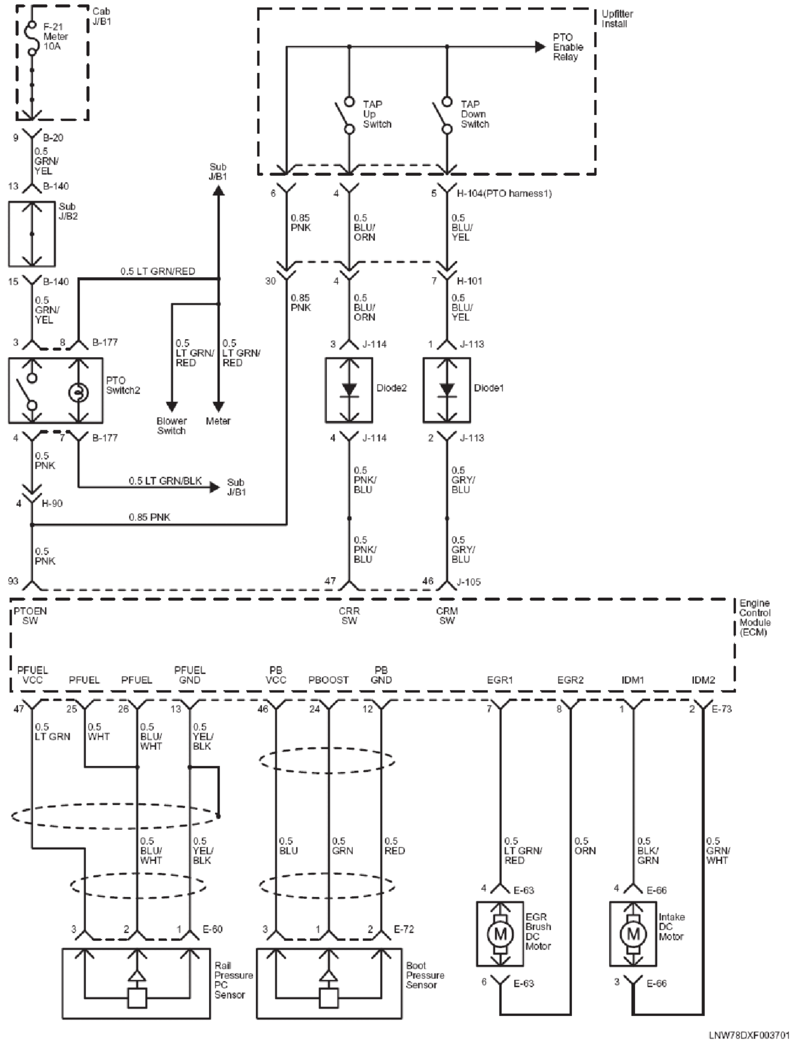

FRAME_R_TO_PTO2_CAP
DELPHI
HOUSING_12045808
DELPHI_HOUSING_12065425
DUMMY_SEAL_12059168
TPA_12124264
NC
NC
NC
NC
NC
NC
NC
NC
NC
NC
FRAME_R_TO_PTO2
98009848
8980098480
DELPHI_12065425
.B
WP.female
TERMINAL_12084200
CABLE_SEAL_12048087
TPA_12124264
CPA_12020833
IC169
NC
IZ07
IC171
IC170
IC167
IC165
IC166
IC168
IC180

PTO 2 CONNECTOR H105				
CIRCUIT NUMBER	WIRE COLOR CODE	WIRING DIAGRAM REFERENCE	WIRING DIAGRAM NUMBER	WIRING DIAGRAM ECM LABEL
IC169	P/B	LNW78DXF003901	1	PTODIS SW
NC	NC	NC	2	NC
IZ07	B	LNW78DXF003801	3	GRND
IC171	R/G	LNW78DXF003901	4	REST SW
IC170	R/B	LNW78DXF003901	5	RRES SW
IC167	BR	LNW78DXF003801	6	CCDIS SW
IC165	GY/R	LNW78DXF003801	7	SSPA SW
IC166	R/L	LNW78DXF003801	8	SSPB SW
IC168	R/G	LNW78DXF003801	9	IGBC SW
IC180	R/B	LNW78DXF003801	10	PWR

Harness end parts available from **www.powerandsignal.com**

PTO Harness Diagram – Illustration #7

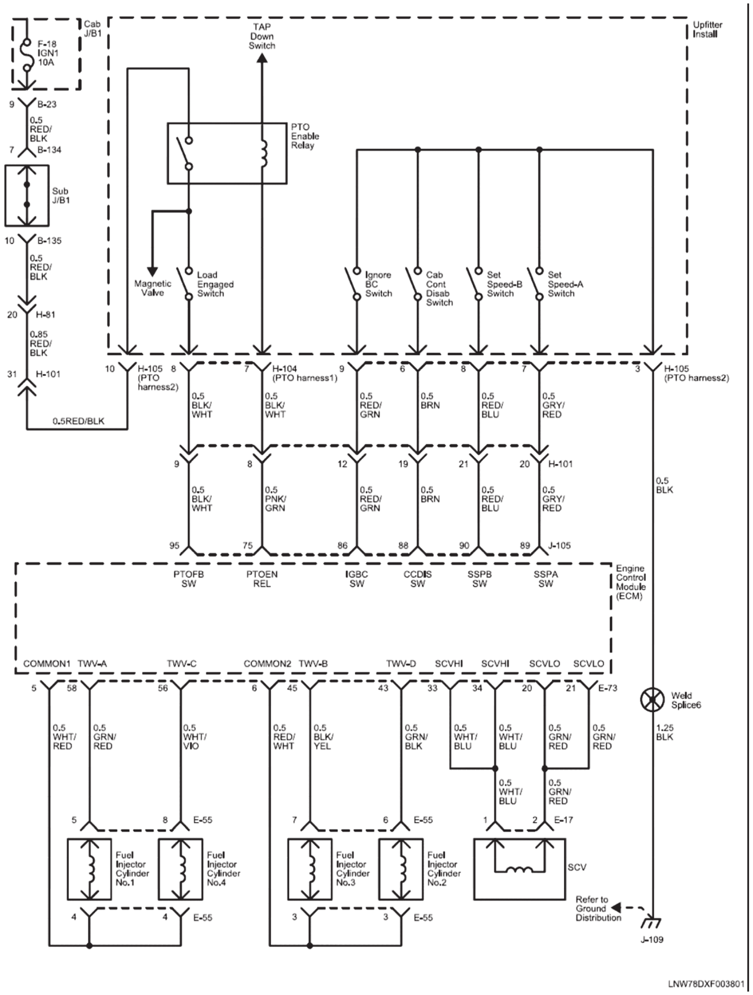
LNW78DXF003701


Cab J/B1
F-21 Meter 10A
9 B-20
0.5 GRN/YEL
13 B-140
Sub J/B2
15 B-140
0.5 GRN/YEL
0.5 LT GRN/RED
Sub J/B1
3 8 B-177
0.5 LT GRN/RED
0.5 LT GRN/RED
PTO Switch2
Blower Switch
Meter
4 7 B-177
0.5 PNK
0.5 LT GRN/BLK
Sub J/B1
4 H-90
0.85 PNK
0.5 PNK
93
Upfitter Install
PTO Enable Relay
TAP Up Switch
TAP Down Switch
6 4 5 H-104(PTO harness1)
0.85 PNK
0.5 BLU/ORN
0.5 BLU/YEL
30 4 7 H-101
0.85 PNK
0.5 BLU/ORN
0.5 BLU/YEL
3 J-114
1 J-113
Diode2
Diode1
4 J-114
2 J-113
0.5 PNK/BLU
0.5 GRY/BLU
0.5 PNK/BLU
0.5 GRY/BLU
47 46 J-105
PTOEN SW
CRR SW
CRM SW
Engine Control Module (ECM)
PFUEL VCC
PFUEL
PFUEL
PFUEL GND
PB VCC
PBOOST
PB GND
EGR1
EGR2
IDM1
IDM2
47 25 26 13 46 24 12 7 8 1 2 E-73
0.5 LT GRN
0.5 WHT
0.5 BLU/WHT
0.5 YEL/BLK
0.5 BLU/WHT
0.5 YEL/BLK
0.5 BLU
0.5 GRN
0.5 RED
0.5 LT GRN/RED
0.5 ORN
0.5 BLK/GRN
0.5 GRN/WHT
4 E-63
4 E-66
3 2 1 E-60
3 1 2 E-72
Rail Pressure PC Sensor
Boot Pressure Sensor
EGR Brush DC Motor
Intake DC Motor
M
M
6 E-63
3 E-66
LNW78DXF003701

Ill # 7

PTO Harness Diagram – Illustration #8

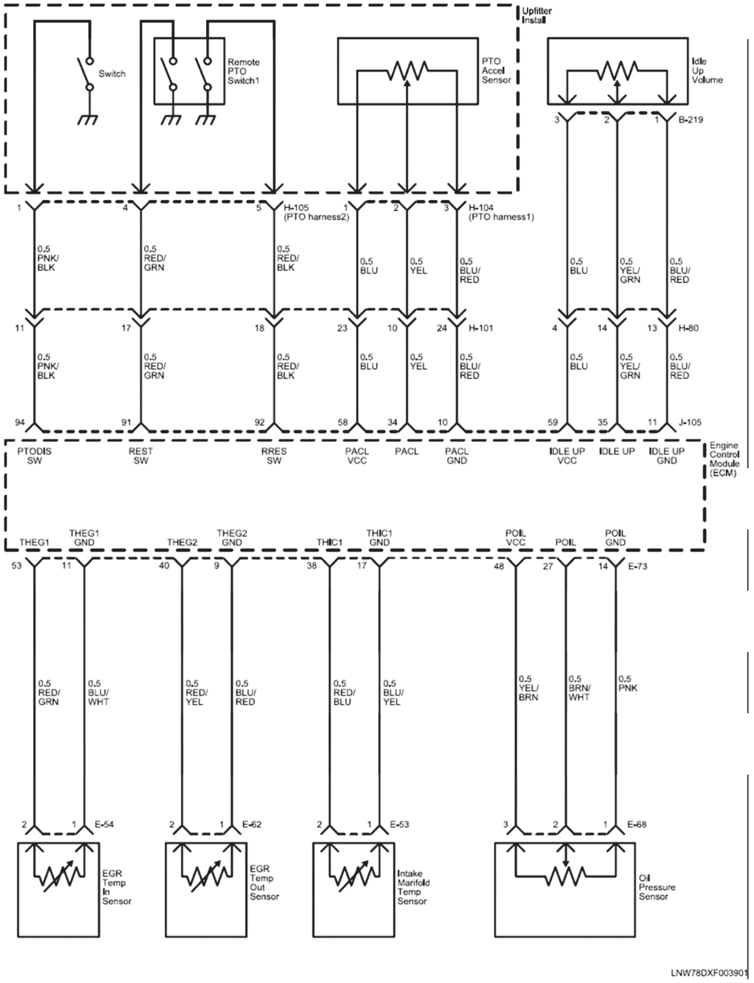
LNW78DXF003801


Cab J/B1
F-18 IGN1 10A
9 B-23
0.5 RED/BLK
7 B-134
Sub J/B1
10 B-135
0.5 RED/BLK
20 H-81
0.85 RED/BLK
31 H-101
0.5RED/BLK
TAP Down Switch
PTO Enable Relay
Upfitter Install
Magnetic Valve
Load Engaged Switch
Ignore BC Switch
Cab Cont Disab Switch
Set Speed-B Switch
Set Speed-A Switch
10 H-105 (PTO harness2)
8
7 H-104 (PTO harness1)
9
6
8
7
3 H-105 (PTO harness2)
0.5 BLK/WHT
0.5 BLK/WHT
0.5 RED/GRN
0.5 BRN
0.5 RED/BLU
0.5 GRY/RED
9
8
12
19
21
20 H-101
0.5 BLK/WHT
0.5 PNK/GRN
0.5 RED/GRN
0.5 BRN
0.5 RED/BLU
0.5 GRY/RED
0.5 BLK
95
75
86
88
90
89 J-105
PTOFB SW
PTOEN REL
IGBC SW
CCDIS SW
SSPB SW
SSPA SW
Engine Control Module (ECM)
COMMON1
TWV-A
TWV-C
COMMON2
TWV-B
TWV-D
SCVHI
SCVHI
SCVLO
SCVLO
5
58
56
6
45
43
33
34
20
21 E-73
Weld Splice6
0.5 WHT/RED
0.5 GRN/RED
0.5 WHT/VIO
0.5 RED/WHT
0.5 BLK/YEL
0.5 GRN/BLK
0.5 WHT/BLU
0.5 WHT/BLU
0.5 GRN/RED
0.5 GRN/RED
1.25 BLK
0.5 WHT/BLU
0.5 GRN/RED
5
8 E-55
7
6 E-55
1
2 E-17
Fuel Injector Cylinder No.1
Fuel Injector Cylinder No.4
Fuel Injector Cylinder No.3
Fuel Injector Cylinder No.2
SCV
Refer to Ground Distribution
4
4 E-55
3
3 E-55
J-109
LNW78DXF003801

Ill #8

PTO Harness Diagram – Illustration #9

LNW78DXF003901


Upfitter Install
Switch
Remote PTO Switch1
PTO Accel Sensor
Idle Up Volume
3
2
1
B-219
1
4
5
H-105 (PTO harness2)
1
2
3
H-104 (PTO harness1)
0.5 PNK/ BLK
0.5 RED/ GRN
0.5 RED/ BLK
0.5 BLU
0.5 YEL
0.5 BLU/ RED
0.5 BLU
0.5 YEL/ GRN
0.5 BLU/ RED
11
17
18
23
10
24
H-101
4
14
13
H-80
0.5 PNK/ BLK
0.5 RED/ GRN
0.5 RED/ BLK
0.5 BLU
0.5 YEL
0.5 BLU/ RED
0.5 BLU
0.5 YEL/ GRN
0.5 BLU/ RED
94
91
92
58
34
10
59
35
11
J-105
PTODIS SW
REST SW
RRES SW
PACL VCC
PACL
PACL GND
IDLE UP VCC
IDLE UP
IDLE UP GND
Engine Control Module (ECM)
THEG1
THEG1 GND
THEG2
THEG2 GND
THIC1
THIC1 GND
POIL VCC
POIL
POIL GND
53
11
40
9
38
17
48
27
14
E-73
0.5 RED/ GRN
0.5 BLU/ WHT
0.5 RED/ YEL
0.5 BLU/ RED
0.5 RED/ BLU
0.5 BLU/ YEL
0.5 YEL/ BRN
0.5 BRN/ WHT
0.5 PNK
2
1
E-54
2
1
E-62
2
1
E-53
3
2
1
E-68
EGR Temp In Sensor
EGR Temp Out Sensor
Intake Manifold Temp Sensor
Oil Pressure Sensor
LNW78DXF003901

Ill #9

LOW SPEED APPLICATIONS FOR N AND W SERIES CHASSIS

Any low speed vehicle applications using the Aisin Transmission such as sweeper, highway striping and road side mowing airport service must adhere to the following guidelines in order to prevent the over heating of the automatic transmission fluid.

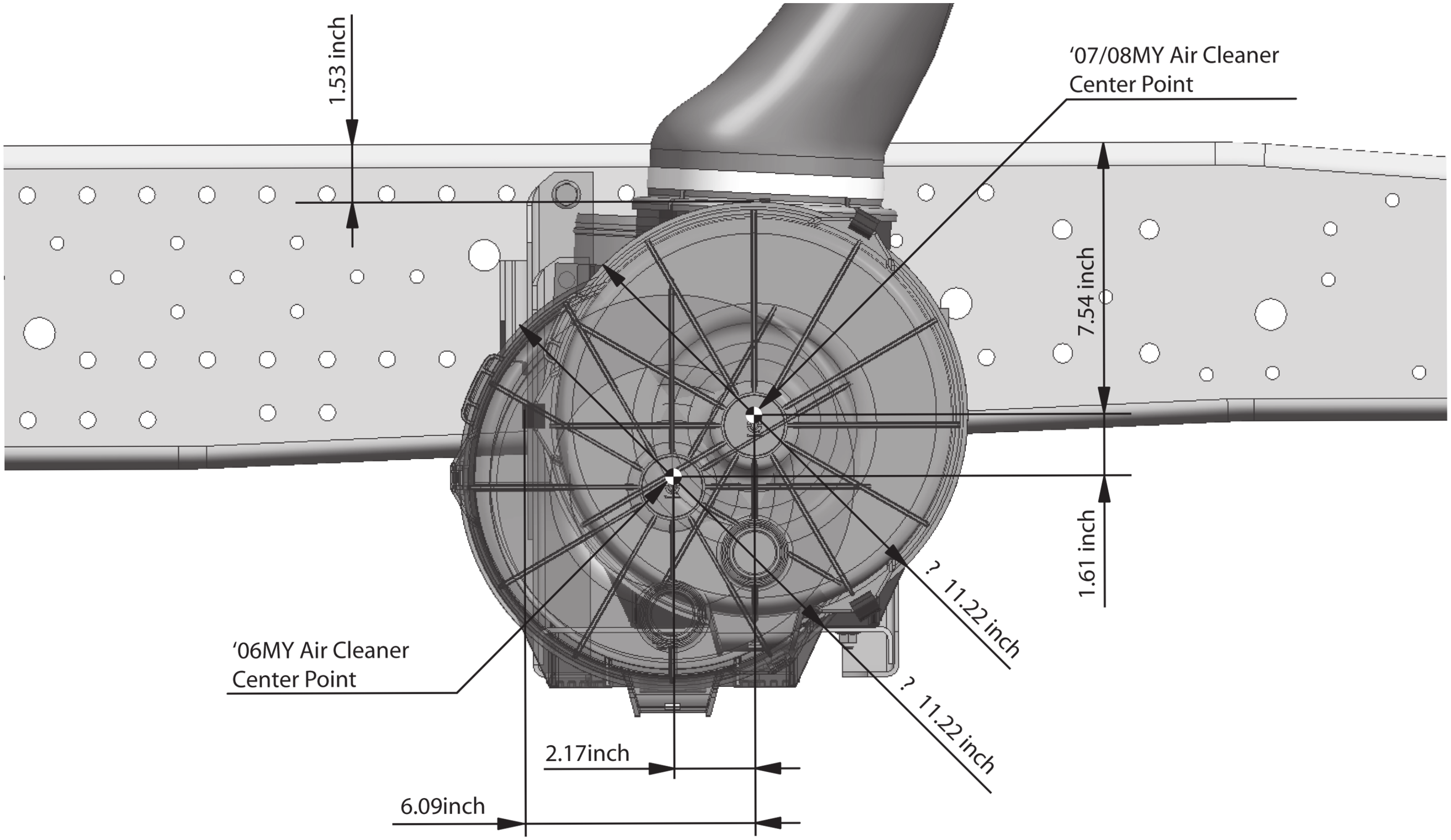
Factory Recommendation:
Select Range 1 for low speed operations under 11 mph, (18km/h).
Select Range 2 for low speed operation under 22 mph, (36km/h).

Note: Installation of Auxiliary automatic transmission fluid cooler will void warranty on transmission/engine.

Reference information:
Automatic transmission fluid temperature warning lamp illuminates over 140 Centigrade/284°Fahrenheit.

Diesel Air Cleaner Canister

Air Cleaner Position


1.53 inch
'07/08MY Air Cleaner Center Point
7.54 inch
1.61 inch
? 11.22 inch
? 11.22 inch
'06MY Air Cleaner Center Point
2.17inch
6.09inch